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VIEWS, NEWS AND INTERVIEWS

Albon P. Man, one of the co-inventors of the Sawyer-Man incandescent lamp, is a hale and hearty old gentleman who still takes an interest in current affairs. According to the *Saturday Evening Post*, of Philadelphia, Mr. Man not long ago attended a lecture in Brooklyn, N. Y., upon an electrical subject. At the close the speaker called for comments and criticisms from the auditors.

Mr. Man, who was sitting well back in the hall, arose, and, quoting a long statement from the lecture concerning a difficult process, asked if he had heard it correctly.

"With remarkable accuracy, sir," replied the lecturer. "They are almost my very words."

The inventor then clearly but cogently tore the lecturer's argument to pieces, greatly to the latter's astonishment and to the amusement of the audience. As he sat down the lecturer said:

"I can hardly reply at present. You seem to have some information on the subject."

"Yes," replied Mr. Man; "I discovered the process myself nearly thirty years ago."

Engineers and others in search of "horrible examples" will do well to inspect the electric railway at Meriden, Ct., which is owned and operated (?) by the New York, New Haven & Hartford Railroad Company. As a clear demonstration of "how not to do it," this electric railway is a glowing success.

The announcement comes from London that Hiram Maxim, the inventor of machine guns and other munitions of war, has become a naturalized English citizen. Mr. Maxim has lived in England since 1883, when he first went abroad as a representative of an American electrical concern. Mr. Maxim holds several patents on electrical apparatus. He was born at Sangerville, Me., in 1840, and his first invention was an automatic mousetrap. It will be remembered that several years ago, in the flourishing days of the New York Electric Club, Mr. Maxim delivered an interesting lecture on his rapid-firing gun, accompanied by a practical demonstration of its rapidity. The muzzle of the gun was turned into the fire-place in the parlors of the club and a steel shield was fitted around the muzzle so that the powder smoke would be carried up the chimney. When Mr. Maxim began his practical demonstration the sound of firing attracted a crowd in front of the club-house which required the efforts of several policemen to disperse.

According to a daily newspaper, Lineman John Diehl, employed by the Western Union Telegraph Company, got a severe shock the other day while working on a pole at Broad and Commerce streets, Newark, N. J. He fell from his perch among the wires and hung doubled over a cross-arm fifty-five feet above the pavement. It seemed as if he might fall at any moment, and while a clerk in a grocery called for a hook and ladder company, others piled empty barrels and packing material under the pole to soften his fall. The hook and ladder truck was approaching when Diehl woke up and descended the pole, not seriously injured. He said that he remembered nothing after the shock until he looked down and saw the crowd under him. It would be interesting to know whether or not the company docked Diehl for the time he was asleep.

It is reported that one of the prominent telegraph companies is making great efforts to increase its local business in certain sections of New England by selling its customers a cable code which will enable a message as long as an ordinary letter to be sent for the price of a ten-word telegram. It is said that the telephone companies have become such sharp competitors of the telegraph companies that this measure for regaining trade has been adopted.

The trustees of the Franklin Fund have decided to erect in Boston a public assembly building, public bath-houses, public convenience stations and public emergency hospital stations. It was hoped for some time that the fund would be used for the establishment of a trade, technical or industrial school, but the fates have decided otherwise.

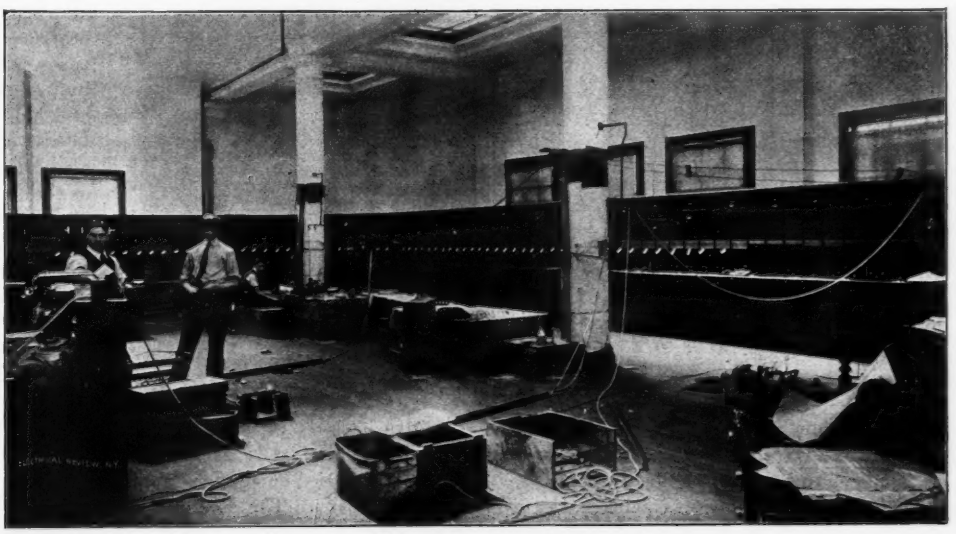


FIG. 1.—GENERAL VIEW OF THE NEW MAIN SWITCHBOARD IN THE WILLOUGHBY STREET EXCHANGE OF THE NEW YORK AND NEW JERSEY TELEPHONE COMPANY, BROOKLYN, N. Y.

A LARGE COMMON-BATTERY TELEPHONE EXCHANGE.

THE NEW MAIN EXCHANGE OF THE NEW YORK & NEW JERSEY TELEPHONE COMPANY IN BROOKLYN, N. Y.

In a large and handsome new building at 81 Willoughby street, Brooklyn, N. Y., the New York & New Jersey Telephone Company is just completing the installation of a new and very elaborate telephone exchange, on the common-battery system which this company is gradually introducing into all of its many central offices. This exchange, when completed, will replace what is known as the "Main" exchange in Brooklyn, now operated on the old-fashioned multiple-switchboard, distributed-energy system, and will represent, when completed, perhaps the highest exemplification of the skill and progress of the telephone engineer.

The cables enter the building from the street through a system of curved pipes, which permit the several hundred different lines of cable to be gathered into a compact mass in the cellar, whence they ascend through a large brick flue to the top floor. Here they encounter first the main distributing board, of which Fig. 2 gives a rather inadequate idea. The complexity of such a structure as a main distributing board for a system involving 5,000 or more telephones is amazing, though the details are, of course, comparatively simple. This board, like the others about the building, is constructed of structural steel of the lightest yet strongest possible variety, and occupies exceedingly little space in comparison with the large number of circuits handled upon it. In front of this distributing board is a collection of boards well shown in the background of Fig. 3. Here the in-

coming circuits are led through relays which operate the circuits of the little lamps used on the main switchboard described below. There is also a large bank of repeating coils and of condensers, for use in connection with other stations not using the central-energy system. Forming a right-angle with this set of boards, and in this way enclosing a space about thirty feet square, is another set of switchboards for the management of the motor-generators and other dynamo machinery, the distribution of the storage battery circuits to be described later, and the accommodation of a large number of resistance lamps which are used in the circuits of the small indicator lamps on the main board.

The common-battery system is, as its name implies, one in which a single battery at the exchange itself takes the place of the individual batteries at subscribers' stations. In this station the battery consists of eleven very large cells of accumulator. These are supplied by motor generators, working on one side at 125 volts and giving twenty-five on the other, of which two are installed as shown in Fig. 2. One of these is fed from the electric supply service of the building and the other can be immediately connected to the current supply system of the electric light company, so that in case of accident to the local plant there will be no stoppage of the exchange service for lack of current. Installed near these are four small dynamotors, of which the function is to furnish alternating current for calling (bell-ringing) and a variety of signals known as "tones" and "taps" for testing whether lines are busy. The main switchboard, which is shown in Fig. 1, contains 4,900 drops, or rather it contains the termini of 4,900 lines and no drops. When the subscriber signals central by taking his receiver off its hook the relay on the relay rack corresponding to his circuit is operated, and a miniature incandescent lamp of about one candle-power, set behind an oval glass bull's-eye about three-eighths of an inch in diameter, lights up on the board in front of the operator. Directly over this little lamp is a hole, into which she thrusts a jack-plug and puts herself into communication with the subscriber, finding out the number that he desires. Having found this out and plugged in the other end of the jack-cord to the subscriber desired, two little lamps in the cord itself, on the flat part of the board, light up and remain lighted until the called subscriber answers by taking his telephone from its hook. While the conversation proceeds no lamps appear lighted, but when it is finished and the subscribers hang up their respective instruments, the cord lamps again flash out, showing that the conversation is ended and the line clear. The operator then pulls the jacks from the holes and all is ready for another connection. It is stated that in the operation of the Bedford exchange in Brooklyn, for a very large number of subscribers, only eighteen of the little lamps gave out in three months' operation. This great switchboard will require forty-one operators in continuous service, or a total of 150 operators altogether to take the various daily shifts. In addition to this switchboard, which the illustration shows in a very incomplete condition, the main operating room also contains a toll-line board which will employ no less than twenty-four operators. It is the intention of the company to make this main station in Brooklyn the centre of a very large system of toll-lines radiating through Long Island, Staten Island and New Jersey. The operating room itself is of very large dimensions, with a high ceiling and ample ventilation, and is artistically decorated in light colors. Adjoining it are large retiring rooms for the operators, fitted with all conveniences and comforts. The board was constructed by the Western Electric Company, of Chicago and New York, upon the fundamental invention of Mr. J. J. Carty, who devised the central-energy system. The installation was directly under the supervision of General Superintendent J. C. Reilly, of the New York & New Jersey Telephone Company.

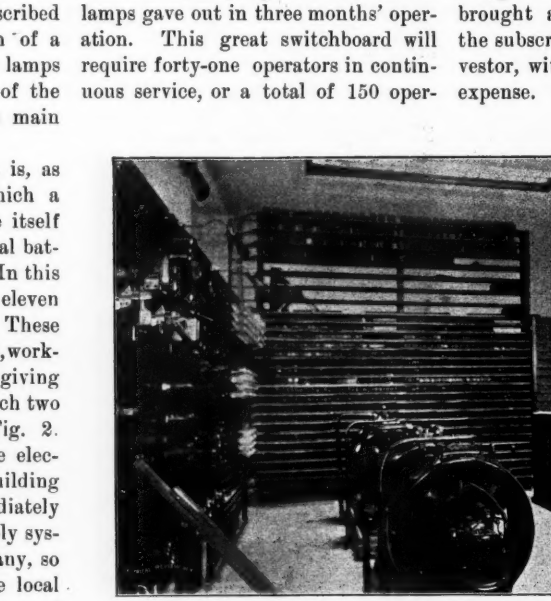


FIG. 2.—MOTOR-GENERATORS, DYNAMOTORS, POWER SWITCHBOARD, RESISTANCE LAMPS AND RELAY RACK IN THE WILLOUGHBY STREET EXCHANGE OF THE NEW YORK & NEW JERSEY TELEPHONE COMPANY, BROOKLYN, N. Y.

The territory occupied by this telephone company is the most important in the United States, including the city of Brooklyn, Long Island, Staten Island and the northern half of New Jersey. The company has been ably managed from the start, and its active head is Mr. W. D. Sargent, vice-president and general manager. The interests of the subscribers and the detailed management of the financial and technical affairs of the company have been conducted along that happy mean that has brought a maximum satisfaction to the subscribers and a profit to the investor, with a minimum of worry and expense. There is probably no more sensitive business or one with more delicate nerves and ramifications than that carried on by a large telephone company. The New York & New Jersey Telephone Company has been particularly successful in the conduct of its affairs, and under its present efficient management is always quick to take advantage of the latest improvement that may prove of advantage to its subscribers, which now number some 28,000.

The Willoughby street exchange described above will be opened for service about November 15, 1899. All the exchanges in the company's system will have the common-battery equipment by the Spring of 1901.

Another Steam Railway to Adopt the Third Rail.

It was reported on Monday of this week that the Long Island Railroad Company would equip five miles of its road with the third-rail electric system. The experiment will be tried on the Far Rockaway division, and if it should prove successful, it is said to be probable that the entire road will be electrically equipped.

FRENCH NOTES.

The Automobile Club has for some time past been occupied with the subject of charging stations or boxes, these to be placed in the streets of cities, and at other points where a current supply may be obtained. In this manner the charging of automobiles will be accomplished *en route* with great facility, thus avoiding the inconvenience of making a special trip to the nearest supply station. To this end the Automobile Club, in connection with the Syndicate of Electrical Industries and the Association of Electrical Engineers, have appointed a committee to take charge of the matter, and to determine the best method of establishing these charging boxes, as well as to fix upon a standard type. A competitive test was opened some time since, in which four different firms were entered. According to the conditions laid down by the committee, these boxes are to have somewhat the same general appearance as fire-alarm or telegraph boxes, and are to be mounted on an iron column or attached to the wall of a building. Each of the boxes is to have a flexible cable, provided with a special plug which fits into a socket on the accumulator box of the vehicle. These sockets will be of standard type and will doubtless be adopted by all the contractors, thus enabling the vehicle to be charged at any of these stations. The committee, after a careful examination of the apparatus submitted from every point of view, has now given its report.

The apparatus furnished by the different competitors fulfill generally the conditions required, and even in some cases contains ingenious arrangements, such as automatic prepaying and energy-registering devices, etc. As to the plug contact, this has not been so well designed, and is still open to improvement. Some of these are either too large or too heavy, and one of them has two distinct parts which may cause short-circuits. The committee therefore considers that the problem of finding a good contact device remains to be solved. The first mention was given to the apparatus furnished by the Compagnie Generale de Travaux d' Eclairage, which is, on the whole, well designed and ingenious. This box is especially adapted for city service, and is mounted on the top of a short iron column. Its height from the ground is about 1.9 metres. The cables, which are attached to the underground mains, pass up through the column into the box, and are protected by a metal sheath. The box has a

double door, which, when opened, shows the switchboard, containing below two fuse blocks, a double-pole switch and a rheostat handle. Above these are placed side by side the voltmeter and ammeter, provided with polarity indicators. Above the switchboard is a meter, which is arranged to start automatically upon the insertion of a certain coin or metal disk. The rheostat is placed in the top of the box, in which position it is well ventilated. The cables carrying the contact plugs for the batteries are taken out by a small door in the column of the box. The plug is so arranged that a single movement suffices to put it in place in the socket on the accumulator box, and all error is avoided. The operation of charging the battery is as follows: The attendant in charge opens the doors of the box, takes out the cable and puts the connecting plug into the socket. The conductor of the vehicle then puts into the slot the required coin, or other piece, representing the value of the charge he wishes. The attendant then closes the switch, and by adjusting the rheostat regulates the current to the required point. The battery may be then left on charge without further attention until the charging is finished. Thus one attendant can take care of several boxes at a time. The contact plug for this type of box is considered too heavy and bulky, and it may eventually cause a grounding of one of the poles. The price, 1,350 francs, is considered high. The second mention was given to the Société Pour le Travail Electrique des Metaux (Electric Metal Working Company). This apparatus, which fulfills the conditions of the programme, is less expensive, costing but 750 francs. The plug is of the concentric type and is well insulated, but is too large and heavy. The third box is too large and is incomplete, lacking an ammeter. The fourth box submitted is ingeniously designed and occupies a small space, but its internal arrangements are too complicated and likely to get out of order. The two plugs may give rise to short-circuits. Whether the committee decide to adopt one of the first mentioned types or await further improvements, it is likely, at all events, that a system of this kind will be established in the near future.

The Compagnie Genarale des Omnibus, one of the principal traction companies of the city, is now engaged in the transformation of two of its lines from animal to electric traction on the accumulator system. The lines Louvre–Vincennes and Cours de Vincennes will be thus transformed, and for this purpose a generating station is to be established, which will furnish 2,000 kilowatts having five generator units. Three of these consist of horizontal engines driving dynamos with exterior fields; the remaining two dynamos are driven by Laval steam turbines by means of intermediary gearing. The first-mentioned dynamos are of a novel type, having a fixed interior field held by eight arms to a central frame. The armature, of Gramme ring form, turns at the exterior of the field and is fixed to the shaft of the engine; its winding is of copper bars and the collector is on the exterior surface of the armature. Each of these machines gives 400 kilowatts at 550 volts. As to the second series of machines the steam turbines give each 300 horse-power. The speed of the turbine is reduced by means of special cylindrical gear wheels of large surface, one of which is placed on either side of the pinion of the turbine, and drives one of the armatures of a double dynamo of the Breguet type The two armatures are connected in series, giving 200 kilowatts at 550 volts. In order to charge the accumulators of the cars, several charging stations or boxes have been established at certain points on the line. These boxes are somewhat on the same general type as those mentioned above, and contain all the necessary apparatus, cables, etc., for charging the accumulators. For the underground distribution concentric armored cables are used, having a section of 500 square millimetres for each circuit with pilot wire. The time of charging will not exceed fifteen minutes, and the charging boxes are arranged for several cars at a time. The cars will have two motors suspended between the axles; these motors are of a special type and are of two kinds, the first having four poles and a gramme armature, and the second two field coils and two consequent poles with drum armature. Each car is provided with a Soulerin air-brake as well as with electric brakes. It will carry eighteen tons of battery, distributed under the seats; its trailer will also carry eight tons. These accumulators will be furnished by the Tudor and the Blot companies.

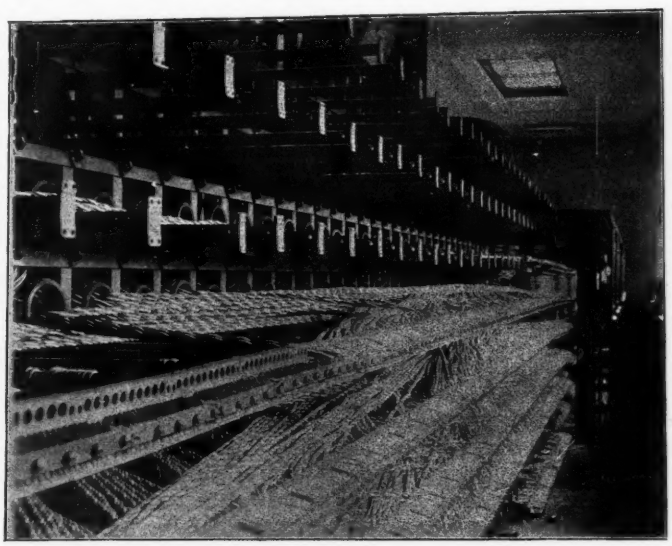


FIG. 3.—BACK OF MAIN DISTRIBUTING SWITCHBOARD, IN THE WILLOUGHBY STREET EXCHANGE OF THE NEW YORK & NEW JERSEY TELEPHONE COMPANY, BROOKLYN, N. Y.

The Eastern Railway Company have designed for use in the reconstruction of the tunnel of Torcenay a traveling generator set which presents several new features, and is certain to be of value in this class of work. It consists of a car adapted to run on the rails of the road, containing a gasoline motor which drives a small dynamo. The current may be used to supply a motor on the axle of the car or to feed the lamps. The car carries six arc lamps and forty incandescent. The advantage of this arrangement is evident in night-work and tunnel construction. Trials are now being made in Germany of an electromobile on somewhat the same lines for use in the army. It resembles somewhat an ambulance wagon, and contains a five horse-power gasoline motor supplied for a fifteen hours' run. The motor drives a dynamo of sixty-three volts and forty amperes, which is connected to a searchlight projector of great power. The vehicle is relatively light and takes up but little space.

At Berlin an electric cab service will shortly be inaugurated, and the first of these vehicles submitted has successfully passed the official examination. These cabs are constructed by the firm Thiesen Berliner Fuhrwesen. The accumulators have a capacity sufficient to insure a continuous run of forty to fifty kilometres. The service in the city of Berlin will not be a severe trial for the electromobiles, as the streets have, for the most part, an asphalt paving, and are comparatively level. The maximum speed of these cabs will be about fifteen kilometres per hour. Active preparations are now being made, and it is expected that the cabs will begin to run in the near future.

Italy, while rich in iron ore, is one of the countries of Europe in which the supply of coal and other combustibles is small, and, for this reason, while the exports of iron ore for one year amount to 200,000 tons, the imports of iron reach 400,000 tons. Efforts are now being made to supply the deficiency in the production of iron, and attention has been called to the possibilities of the electrolytic method, by which the numerous sources of water-power could be utilized. Captain Stessano has recently designed an electric furnace for the reduction of iron from the ore; in this process he employs two carbons, each ten centimetres in diameter and one metre long. The furnace is arranged to receive the ore at the top, while the metal issues below in a continuous stream. The process is an interesting one, as well as economical, and it is to be hoped that it will find industrial application.

C. DE KUBICKI.

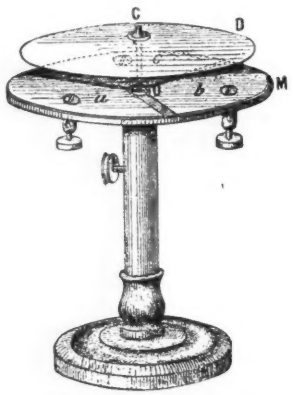
Paris, October 10.

An Important Storage Battery Installation.

The Electric Storage Battery Company, of Philadelphia, has just secured from the Third Avenue Railroad Company, of New York city, a contract for storage batteries amounting to about $400,000. These chloride accumulators will be used in substations in two batteries, each with a regulating capacity of 4,000 amperes. The locations of the substations have been decided upon, and land has been bought, but work upon the buildings has not yet commenced. The function of these battery plants will be of a regulating character entirely.

SCIENCE BREVITIES.

Electrostatic Rotation—A very ingenious and beautiful experiment is described in a late issue of *L'Elettricista*. Referring to the illustration herewith, the disk *D* is made of some dielectric material, such as mica or thin fibre, and is balanced on a pivot at its center *C*, so that it may readily rotate. Under this, the disk *M* of metal is divided into three equal parts, *a*, *b*, *c*, which are connected respectively to the three conductors of a three-phase system. When the current is turned on the disk *M* begins to rotate, the direction of its rotation being determined by whether the potential between any two of the three conductors is higher or lower than a determinate value depending upon the distance of one disk from the other. If, while the disk is rotating, the connection of two of the sectors of the lower disk are interchanged, the rotation is rapidly stopped and then reversed. In the experiment as made, the upper disk was made of paraffined cardboard about three inches in diameter; the



ELECTROSTATIC ROTATOR.

lower disk was about four inches in diameter; the distance between them about one-third of an inch, and, with an effective potential difference of 3,000 volts between the legs of the three-phase circuit, the number of revolutions of the disk was too great to estimate.

The Present Situation of the Electrochemical Industry—At the last meeting of the German Electro-chemical Society, Herr Borchers gave some interesting details about the present condition of the electro-chemical industry. Processes of this nature are used to-day exclusively for producing aluminum, potassium, magnesium, sodium and hydrogen. They are applied concurrently with other methods in the manufacture of lead, chlorine, iron, gold, cobalt, graphite, copper, nickel, platinum, phosphorus, oxygen, silver, bismuth, zinc and tin. There are experiments going on now looking to their use in the production of antimony, arsenic, chromium, manganese, mercury and other substances. The principal products for last year were as follows: Aluminum, 12,930 tons; copper, 166,000 tons; chloride of lime, 225,000 tons; carborundum, 1,585 tons, and 45,804 avoirdupois pounds of gold.

The Phosphorescence of Glass—At a recent meeting of the French Association for the Advancement of Science, Dr. Stéphane Leduc described some curious phenomena of the phosphorescence of glass. He found that X-ray tubes retain their green luminosity after the current has been turned off, and that this phosphorescent light can be caused to glow without electricity by heating the tube over a Bunsen burner or alcohol lamp. The glass of a broken tube also preserves its phosphorescent quality but loses it after repeated heatings.

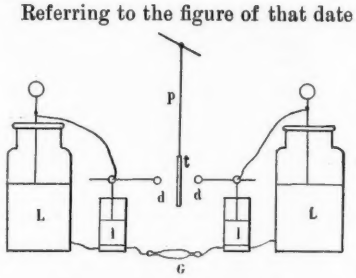
Magnetic Ore Separation—An instructive paper on the use of finely divided ores was recently presented to the Iron and Steel Institute by Prof. J. Wiborg, of Stockholm. The powdered ore is the result of magnetic separation. The magnetic separation can, of course, only be practiced on ground ores, but the resulting dust presents many difficulties in use. It is apparently more easily dealt with on the cold blast system than by the hot blast, but it is not altogether a success even with the former. Powdered ores tend to give rise to the evil of scaffolding. The methods of using fine ore are by pressing it into bricks and heating it until it agglomerates by the action of its own constituents, especially if it contain much fusible silicate, or by mixing such ores as do not agglomerate naturally, with powdered slag. But these methods are costly. Again, the ore may be damped and pressed into bricks, and kiln burned into masses of sufficient strength and coherence, or the ore may be mixed with lime and hardened by absorption of carbonic acid from the air. Again, the ore may be mixed with hydro-carbonaceous material and coked, or it may be mixed with powdered coal and cooked in the usual way, when it has been found to stand quenching and considerable exposure before use. The method is simple, and if further trials prove its success the use of magnetically separated ore will increase. Needless to say, the magnetic separation removes much useless stuff and enables a good concentrate to be obtained from inferior ores, and waste in working can be much reduced. Given a satisfactory method of combination so as to enable the ore to be easily used, and an impetus will be given to the use of magnetic separation machinery.

LEYDEN JAR EXPERIMENTS.

BY ALFRED G. DELL.

In the following, I give a description of some experiments made with the arrangement described in the ELECTRICAL REVIEW of October 18, 1899.

Referring to the figure of that date



LEYDEN JAR EXPERIMENTS.

(which is here reprinted), I removed the Geissler tube *G*, it being unnecessary in these experiments, and connected the ends of the two wires to which it had been connected. To the tin-foil at the end of the pendulum, I connected a small copper wire (No. 36), extending it some eight feet in the room, and to the other end of this I attached a piece of tin-foil 2½ by 9 inches. On turning the Wimshurst machine, I found the wire extending out in the room became brilliant with radiation. It appeared at one time like a feather of fire, and then dark again, repeating these phenomena over and over. A Geissler tube held in the hand within a few feet of the wire glowed alternately. With this arrangement, I had to keep the static machine running, as the radiation was too great to allow the pendulum to swing longer than about twenty seconds while the machine was idle.

To discover by experiment the cause of the brushes on the wire, I cut off part of the No. 36 wire, until I had only about a foot attached to the pendulum, and swung it behind the machine so I could watch it closely. I arranged the pendulum so I could work it by hand, swing it against either pole at pleasure, and know exactly where it was without seeing it, the room being darkened. I found that when I approached the positive pole with the tin-foil, there would be a few sparks to it, and brushes on the wire would start; when the tin-foil made contact, the wire would be brilliant with brushes, they appearing to extend an inch all around it, and on moving the tin-foil from the pole, they disappeared. On approaching the negative pole there would be a few sparks to the tin-foil in the same manner as the positive pole; on contact, the wires became fully charged with negative electricity but few or no brushes were seen, but at the free end of the wire there appeared a large glow of great brilliancy. I then fastened some No. 36 wire to a piece of cardboard in form of squares, and pasted on its back a piece of tin-foil, connecting it with the end of the wires arranged in squares. I found the same brilliant brushes on the wire leading to the squares when excited by positive electricity. The squares had brushes, but nothing like the free wire, they appearing quite small on the squares. The brushes seem to be checked by the cardboard and loose strings with which I fastened the wires on the squares. With the negative charge little or nothing was seen. It is evident the visible radiation or dissipation of positive electricity is far greater than that of negative.

NOTES ON LIGHT.

BY WILLIAM ROLLINS.

NOTE LXVII—ON EXCITING TUBES HAVING HIGH VACUUMS.

When lighted by a powerful generator an X-light tube becomes much lower after a few moments' use. It is therefore necessary to have the vacuum very high, as otherwise the tube becomes too low to be an economical source of X-light, too much of the energy being wasted as heat and ordinary light. For such a generator the tube should not be taken from the pump until, roughly speaking, the vacuum is equal to ten inches of air. When we attempt to light a tube having this amount of resistance there is risk of puncturing it. This danger may be diminished by enclosing the tube in a box and bringing it to a temperature of 300 degrees Fahrenheit. When, however, by long use the vacuum when cold is still higher, even this method does not obviate the risk. We therefore require some means of quickly, but temporarily, lowering the vacuum until the tube becomes lighted and lowered by the normal working. The temporary lowering should then cease and its effects vanish. One way in which I accom-

plish this is as follows: As is well known, the result of prolonged use of a tube is permanently to raise the vacuum until the tube becomes useless. The usual remedy is the attachment of a small bulb containing potash. The potash gives off something on being heated that lowers the vacuum, but after a time this kind of a regulator fails. Heating the potash will still lower the vacuum, but as soon as it is cool the vacuum goes up again, because the substance given off is reabsorbed. I therefore invented the intermolecular vacuum regulator of palladium or platinum tubing, which overcomes this difficulty, and have tried to convert the defect of the potash regulator into a merit, using it to overcome the initial high vacuum in a tube. The potash is first heated in a metal crucible to drive off the water. It is then in about the same condition as in the usual potash regulator when this has been used so long as to fail to work. By now sealing the potash into the ordinary supplementary tube and heating it, we shall find that only a moment is required to lower even the very highest vacuum sufficiently for a generator of ordinary power to light the tube. When the current is established and the tube well lighted, the potash may be allowed to cool and reabsorb what it gave off in this way, not permanently lowering the vacuum. Those who are familiar with early vacuum tube research will remember that Crookes used this method to show the appearances in a tube due to different degrees of vacuum. I also applied it to a tube, as stated in Note v., ELECTRICAL REVIEW, December 15, 1897, to show that the focus of the cathode stream varied in distance from the cathode, according to the degree of the vacuum.

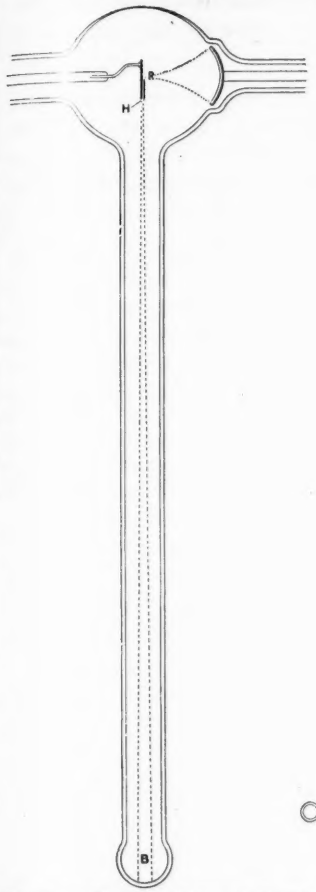


FIG. 62.—"NOTES ON LIGHT"—SCALE ONE-QUARTER.

The application mentioned in this present note is, however, new, and of sufficient practical moment to the few who are using powerful apparatus to warrant devoting some space to it.

NOTE LXVIII—OUTBURSTS OF HYDROGEN IN X-LIGHT TUBES.

In Note xxix some directions were given for pumping tubes for use with generators of considerable power. Further experience in preparing tubes for still larger generators has shown many interesting phenomena, one of which, having a practical bearing, I mention here. In preparing a tube for such a generator it is well to make the vacuum high and also to drive out a considerable proportion of the gases contained in the glass and in the terminals. This will prevent the vacuum from falling so far when the tube is used. The ideal way is to have the pump so placed that the tube can be exhausted while lighted by the same generator on which it is to be afterward used. Every hospital should therefore have a portable pumping plant for this purpose. Until such an arrangement is commercially available this method is practical only for experimenters. In consequence, a tube always requires a considerable period of readjustment before reaching maximum efficiency when used on a more powerful generator than the one employed to light it while being pumped. If such a tube is observed when the current is first sent through it by the more powerful generator, the amount of light and definition are both unsatisfactory, for the cathode stream is not normal. The energy being greater appears to have difficulty in escaping from the concave surface of the cathode, because the gas has been more thoroughly removed from the metal below this surface than from the back. As a result, we get constant irregular outbursts of hydrogen from the metal at the back of the cathode. The velocity of these particles is great enough for them to radiate X-light when they strike the glass walls of the tube. Their impacts also show as vivid green patches on the glass. If we continue to keep the tube lighted, these appearances stop, the cathode stream becoming normal. Most of the power being now delivered in the normal stream on the radiant area of the target, the amount of available X-light increases and the definition improves. Continued observations show that a considerable proportion at least of the particles, whose impact on the target cause X-light, come from the metal of the cathode, and are not those in circulation in the tube. The cathode is, therefore, not only a muzzle-loading gun, but also a magazine arm highly charged with hydrogen bullets.

NOTE LXIX—A TARGET-ANODE WITH A SLIT.

At first the air was full of theories of X-rays. One was that the rays were streams of particles moving in straight lines; in other words, real rays instead of waves. In thinking of experiments to test the various theories, I constructed a number of tubes, one of which is shown in Fig. 62. To avoid the diffusion which Lenard had observed when the rays were sent through air, I transmitted them in the same vacuum in which they were generated. In the tube shown the target-anode is placed perpendicularly to the line of the cathode stem. The central portions of the Varley stream therefore strike its surface perpendicularly, those forming the outer portions at a small angle. If the target presented a smooth surface to these particles, the result of this construction would be to bunch them more than when the target was placed at the usual angle of forty-five degrees, increasing the collisions among them; but, as these particles are small and the surface relatively rough, this construction does not much increase the light yielded by a tube. In the tube figured the radiant area caused by the impact of the Varley stream is shown by the spot where the line extending from the letter D strikes the target; while as close as possible to this area is a slit made by riveting another piece of platinum to the target. The width of this slit is $\frac{1}{100}$ of an inch, its length in the direction the rays must pass through it is half an inch. The object of placing the slit on the target was to have it as near the place of maximum brilliancy as possible. The rays in passing through the slit went forward in the direction shown by the diverging dotted lines to B. When a fluoroscope or a photographic plate was placed against the tube at this point, the band of light was wider than it should have been if the rays were streams of material particles moving in straight lines.

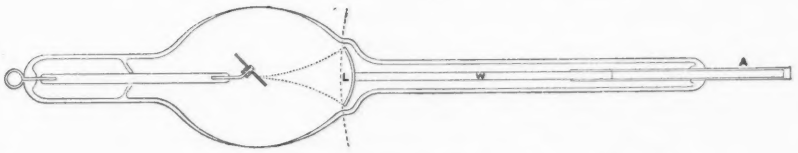


FIG. 63.—"NOTES ON LIGHT"—SCALE ONE-QUARTER.

NOTE LXX—AN X-LIGHT TUBE THAT WAS A BELL.

In Fig. 63 is shown a tube in which the only support for the cathode stem is a hollow platinum regulator sealed to the glass. As a result, the cathode can vibrate slightly in the direction of the dotted arc, but not enough to touch the walls of the tube. The tube was exhausted to a high vacuum while lighted and hot. When cold the vacuum was so high the Varley stream had difficulty in starting. As a result there was the lateral sparking described in a previous note. Shortly the cathode began to vibrate. If the hand was placed on the bulb between the terminals, the Varley stream would of course start and the vibration stop. If the stem were grasped behind the cathode disk, the Varley stream did not form and the tube could be felt in vibration. The cause of the phenomenon was this: The cathode, being capable of some vibration, was pushed by the particles shot off from its edges, there being a mutual repulsion due to their charges being of like sign. When the vibration became rhythmic, the particles striking the glass in regular surges caused it to ring like a bell, though struck by nothing larger than a molecule. I could hear the ringing forty feet away.

About Dry Batteries.

TO THE EDITOR OF ELECTRICAL REVIEW:

Why is it that most dry batteries work better and have a longer life when laid on their sides than when standing up on end? SUBSCRIBER.

Vancouver, B. C., Oct. 18.

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HIGH-SPEED TELEGRAPHY.

In last week's number of the ELECTRICAL REVIEW appeared an article on a system of high-speed telegraphy recently exploited in Austria, which, it is stated, showed the very remarkable record of 100,000 words per minute over a single wire. While this figure is astonishing, it by no means follows that it indicates that such a system has the least practical utility. Indeed, the usefulness of any very high-speed telegraphic system is open to grave question, because all of them that have been invented so far involve no less than three distinct operations in the sending of the message; they require the preparation of the message to be sent, its actual transmission, and the translation of the result, when received, into a form proper to be sent to the recipient. Let us assume, for purposes of argument, that a system capable of sending 100,000 words an hour should be installed between New York and Chicago, say. It is exceedingly unlikely that any expert operator would be able to prepare over 1,500 words an hour for transmission by a tape-punching or other mechanism. Hence, to feed such a line would require not less than sixty-six operators constantly working at the sending end. Similarly, at the receiving end, allowing a speed of twenty-five words per minute for translation and transcription, sixty-six more operators would be required to turn the messages as received into English for transmission to those to whom they are addressed. If these 132 operators worked the usual number of wires (say about twenty when quadruplex and duplex circuits in the usual proportion are counted on), the messages received at the one end would require no translation, but would be immediately ticked off upon the wire by operators, and sent to their recipients in the form received at the other end. The effect would be, consequently, that the so-called high-speed service would introduce two elements of delay—in preparation and in translation. Hence, viewing it from a purely practical standpoint, it would in all probability be slower than the present system. The method employed by the system described last week included a photographic apparatus for receiving the messages, consequently necessitating the development and fixing by photographic processes of the record as received. Nobody who has had to do with telegraphy and photography can fail to recognize that this would introduce an altogether impossible delay and a very great expense. It may therefore be argued that such a system as that described has no single advantage over ordinary telegraphy, while it introduces numerous complexities and points of weakness which are entirely unnecessary. The saving on the wires required would not pay for the photographic films if the system were worked steadily at any reasonable proportion of its capacity.

The increasing size and speed of urban and suburban electric cars begins to necessitate the application of some other brake than the familiar hand apparatus, which is a legacy left us from the days when the surplus energy of one horse could be taken out of him by a gentle squeeze of the handle. Fifteen or twenty tons of car going nearly twenty miles an hour possess an enormous energy and momentum, and it is a strain upon the strength of the motorman to stop such a car suddenly in case of emergency. There is not the least doubt that the time has arrived for the general introduction of power brakes of some form on street railways. Much of the hostility of a certain section of the daily press, commonly termed the "yellow" papers, toward the trolley road would be overcome by the use of a really satisfactory mechanism for stopping cars. It goes without saying that this should be independent of the motive power; and so far two systems fairly well adapted to the exigencies of the case have been invented—electricity and compressed air. The expense attending the installation of these power brakes, however, has been a strong drawback to their general introduction. Even with this handicap the power brake is cheaper than the damage suit, and the whole question is one that deserves the serious consideration of street railway managements.

The enterprising advertiser who seeks to attract the attention of that portion of the public which walks about the streets, has apparently found out that the night-time is as good as day for his purpose, and has pressed the incandescent lamp into service for illuminated signs in a wholly unexpected way. It was only a few years ago when the first electric signs made their appearance, but to-day one can not look along any busy thoroughfare in one of our greater cities in the evening without seeing several illuminated legions confronting him. The art of constructing such signs is a pretty one, and one that has received too little attention from electricians generally. They are a very desirable load for central stations, inasmuch as they burn long hours, and they should form a profitable source of revenue to the electric light company which seeks to extend their use.

It has been pointed out recently that one obstacle in the way of the widespread use of automobiles of any kind is that a very large investment is locked up in horses and vehicles. The latter with care will last many years, and it causes hesitation on the part of a user of wagons, for example, who contemplates replacing them with automobiles, when he sees the necessity for sacrificing his investment in the wagons. To-day he might be able to sell them at a fair price; to-morrow he will not, because wagons will be hopelessly out of fashion. This situation offers an opportunity for inventors. What is wanted is something to replace the horse, not necessarily to replace the horse and vehicle. There is a demand for something that can be attached to the vehicle to make it go. A proper motor apparatus, or even a wheel truck that could go under the fore part, say, of an ordinary horse-driven vehicle, converting it into an automobile, would be cheaper to make and far easier to sell than the necessarily expensive complete automobile machine which replaces both horse and carriage.

BRITISH ELECTRICAL NEWS.

[From our special correspondent.]

The talk here is all of the war, with small interludes of the America Cup race and the cussedness of the weather over your side, and electrical matters are in no sense exciting. The manufacturing firms, great and small, are filled up with orders that will last them for many months to come, and folks are too busy to pay much attention to anything but the speedy disposal of the work in hand. The situation has its drawbacks, as it has the inevitable effect of lessening competition, and with it the theoretical study of the subject which is now enjoying a wave of prosperity, which goes far to remove the stimulus for exertion.

In the matter of electric traction, that exceedingly stolid body, the London County Council, is slowly getting under way, and talks of electric tramway systems in several directions where they are least required, and will most seriously offend local susceptibilities. Eltham and Wimbledon Common are among the regions marked down for tramways, and as these comprise some of the only bits of rural scenery left near London, there is naturally a good deal of irritation at a policy which must result in reducing them sooner or later to the dead level of suburbanism, which is already characteristic of London as a whole. I don't know whether you suffer from the complaint, but "suburbanity, a peri-metropolitan disease," as it has been wittily termed, is one of the most disagreeable features of the environs of our capital, and it is hard that electricity should be pressed into service to spread rather than to counteract it. By the by, I should explain that tramways and light railways in this country are practically synonymous. Light railways can be made without the consent of local bodies, and for tramways, it would seem that their consent is required. Accordingly, when the residents of a given neighborhood object to the introduction of tramways, arrangements are made to call them light railways, which puts the aggrieved parties out of court. It seems probable that in this move lie the germs of future electrical developments, literal and metaphorical. All that the party in power will have to do is to turn an electric tramway loose upon the neighborhood occupied by their opponents, to decrease the value of their landed and house property with a view to bringing them to a better mind. For electricity, in spite of its many and unquestionable merits, does not seem to be a mark of aristocratic neighborhoods.

I think I mentioned to you in my last letter that the National Telephone Company, which bears the heavy responsibility of having killed the telephone industry over here, was professing to make concessions with a view to conciliating public opinion, by reducing its exorbitant rates. There never was a better exemplification of the impropriety of trusting a Greek, even when he brings gifts. Mr. Bennett, the well known expert on this subject, once, if I remember rightly, an employé of that company, has circulated a careful analysis of their proposals to the press, in which he demonstrates that the apparent reduction is a fraud, and that the actual effect of the proposals would be to raise, instead of lowering, the rates at present exacted. So far the company have not replied nor noticed Mr. Bennett's letter. Not for nothing is the company managed by one of the very sharpest men in the country.

And that reminds me of one of the great institutions of our great and glorious metropolis, the underground railway, of which this same gentleman is one of the moving spirits. The last two Summers, as you may have heard, have been particularly warm, and the atmosphere of the tunnels through which the railway runs have been such as to recall the description of the Indian station, of which it was said that a man who died there and was removed to his proper place lost no time in sending up for his great-coat. Add to this that the accommodation is wholly insufficient, and that eighteen in a carriage is no uncommon phenomenon, and you will understand the energy of hatred with which the average Londoner regards this institution. Now it is certain that the adoption of electricity as the tractive power would at once do much to mitigate the horrors of this Inferno, by making the atmosphere less foul, and, therefore, more tolerable. This fact has slowly been borne in upon the public mind, and the bitter cry of the oppressed passenger has at length so far prevailed that the management have undertaken to make "experiments" to see whether electric traction is feasible. Some great engineers have been engaged, and a piece of line, rather less than a mile in length, has been set apart for the solemn rediscovery—or rather resolution—of problems which have already been satisfactorily solved in America and elsewhere. These "experiments" have now proceeded for some months, and a recent announcement states that, in case of their proving successful, we may expect to see electric traction introduced in two years' time or so. You must not, however, take this incident as any index of our electrical progress. Something had to be done to throw dust into the eyes of the public, and perhaps the underground railway authorities and their astute manager could hardly have hit upon a better expedient for so doing. But I must admit that, on the face of it, the incident is not calculated to impress our neighbors very deeply with the rapidity of our electrical progress.

The early engagements in the war have suggested how very useful a system of etheric telegraphy would have been to the isolated garrisons at this juncture. A besieging army may cut wires, but can hardly tackle ether, and had some of Signor Maconi's apparatus been installed in Mafeking and Kimberley at the present moment, much anxiety might have been saved to the friends of the besieged, and much valuable military information interchanged. I hear, however, that some new developments of radiography are to be tried in this war, and in that direction it is hoped that important results may be obtained. Radiography has not been quite so heartily "boomed" as some recent electrical discoveries, but it has a great future before it, nevertheless, when some more of the practical difficulties in connection with it have been overcome.

Electric lighting installations are under construction all over the country. Many of the old stations have had to be greatly enlarged and extended, and many new ones are being undertaken. The success of that at Shoreditch, which is worked in connection with a dust destructor, has attracted a good deal of attention, as I think I have told you, and the experts are now fiercely arguing as to the methods in vogue of keeping the accounts which show the working of it. As all admit, however, that the system has been worked at a considerable profit, the question, of which side of the account waste steam is to be credited to need not greatly concern us. Of course, the belated gas manager continues to put in a word now and then to explain to the public that it is all wrong, and that electric light really costs seven times as much as gas, and is not nearly so pure; that is the latest contention, but the public smiles and passes on its way, having at length realized the advantages of electricity. And so, too, with electric traction. Not long since the battle was in regard to the introduction; now its advantages are admitted, and the fight is only to decide whether it is to be run by municipal or private management. In this matter I do not venture to pronounce an opinion, the more so as I understand that this question has been raised on your side of the Atlantic as well.

London, October 20.

PERSONAL.

Mr. Morris F. Tyler, of New Haven, Ct., president of the Southern New England Telephone Company, has been made treasurer of the corporation of Yale University.

Mr. John A. Brill, of Philadelphia, whose fame as an electric car builder is international, returned last week from a European trip, bronzed from his ocean voyage and in the best of health.

Mr. Charles E. Sharp, of the Southern Electrical Supply Company, St. Louis, Mo., was a visitor in New York city last week. Mr. Sharp reports a very active electrical field in the southwest, and also in Mexico and South American countries.

Mr. R. K. Dana, for many years New York agent for the Washburn & Moen Manufacturing Company, of Worcester, Mass., and latterly the New York agent for the Washburn & Moen department of the American Steel and Wire Company, has resigned his position and will enter other business.

Mr. Charles B. Doolittle, of the Southern New England Telephone Company, New Haven, Ct., and Miss Laura Leggett Seymour were married at Washington, D. C., October 30. Mr. Doolittle is the eldest son of Mr. Thomas B. Doolittle, of the American Bell Telephone Company. The ELECTRICAL REVIEW extends most cordial congratulations.

Mr. P. C. Ackerman, for many years New York manager for the American Electrical Works, of Providence, R. I., and whose resignation from that position was announced in the ELECTRICAL REVIEW last week, has been appointed general sales manager for the Rhode Island Electrical Works, of Pawtucket, R. I., manufacturers of magnet wire. Mr. Ackerman has taken offices at 316 Havemeyer building, New York city, which will be the headquarters of the company's selling department.

Mr. C. S. Knight, vice-president and general manager of the Siemens & Halske Electric Company of America, of Chicago, has resigned that office. He will be succeeded by Mr. O. S. Lyford, Jr., the electrical engineer of the company before it passed into the control of the Whitney syndicate. Mr. Knight will arrive this week in New York to take up another line of work with the syndicate. Mr. Knight is one of the most active and popular electrical men in the fraternity, and will carry with him in his new work the best wishes of a host of friends.

THE TELEPHONE GENERAL AND HIS FRIENDS.

A SWEDISH VIEW OF SOME OF OUR DISTINGUISHED TELEPHONE MEN.

[*A literal translation from the Daily News, Stockholm, October 10, 1899.*]

Sabin, Glidden, Bethell, Webb—These names were yesterday to be seen among a lot of other names on the black notice board of Hotel Rydberg. These four names are capable of conjuring hallucinations. One sees a network of telephone wires extending over thousands of miles on a continent, where men at the same time may die of heat or cold, depending upon whether they find themselves in its northern or southern part; one hears the tinkling from telephone stations by hundred thousands in gigantic towns, where the houses count their stories by tens, the trains rush along the streets, and the newsboys have the shrillest voices in the world. These names belong respectively to the managers of four of the world's greatest telephone companies, all from America.

The first one is as so many distinguished Americans are—a General. General John I. Sabin, president of the Pacific Coast Telephone Companies, is his full title. He resides in San Francisco and wields the sceptre over more than 60,000 telephone stations, distributed on the states of California, Oregon, Washington, Arizona and Nevada. He is a splendid man with big moustaches and a stately carriage, who compliments the ladies of the company and crunches a lump of sugar after his coffee instead of enjoying the Swedish punch. He represents the sanguine element in the quartette.

The phlegmatic one is incorporated in Chas. J. Glidden, president of the Erie Telephone System, a company of 100,000 stations, situated within eight states. It is, however, only in the outer lines, characterized by a certain embonpoint, that the phlegm exists. The eyes flashed sometimes almost as brightly as diamonds. The other two, Mr. U. N. Bethell and Mr. H. L. Webb, may be considered as representatives of the two remaining temperaments, although it must be admitted that the one looked as little choleric as the other looked melancholic, when between cheese and coffee I made their acquaintance.

Sometimes they were singing in quartette, sometimes in duet, and also *soli* were to be heard. All the voices sounded loudly in praise of Sweden and of Mr. Cedergren. Two of them visited for the first time our country, which had, by the chilly magnificence of its Autumn, charmed these strangers as much as other strangers are generally charmed by its Summernight's or Winter's beauty. Mr. Cedergren was some years ago their guest on the other side of the Atlantic, and they rejoiced to see him again.

"He is the best manager of telephone companies in the world, distinguished both as a specialist and as a man," the General declared heartily, and the others agreed.

President Glidden is perhaps more interested in Sweden than the others, one of his chief spheres of action being Minnesota, in the capital of which, St. Paul, one of our most beautiful cities, as he calls it, so many Scandinavians are living. But also in Minneapolis he has many Scandinavians. Whereupon follows a little duet, the topic of which is that the Swedes are brave, nice, clever and industrious.

These are Mr. Glidden's own words, in strictest translation, concerning those of our countrymen who earn their living yonder over the sea. Regarding those whom they have met during their short stay here, they tell us that they are the most amiable persons they have ever seen. The American managers seem, however, not to be behind us in that respect. One of them—I believe it was the choleric one, although there was not a trace of heat in his tone—remarked that he could find nothing but pleasure in the fact that we speak so enormously much per telephone, it being so delightful to hear the Swedes speak. Although fully appreciating this compliment, I could not prevent a wish rising in my heart for some reduction in the torrents of words which, day and night, are flowing through microphones and wires in the capital of Sweden. In quantitative respect, Stockholm's name has made a world's record on the department of the telephone; so many telephone apparatus to so few persons are nowhere else in the world to be found. San Francisco, which comes nearest after Stockholm, has a far lesser number. And therefore it is that the managers of the gigantic companies in that country, where the cradle of the telephone stood and where improvements thereof are constantly invented, have come here in order to see how we turn the important commercial and social invention to profit. Their presence is a compliment that we ought highly to appreciate. CATHARINA.

Telephone News .....and Comment

"Any person that can afford to burn gas needs a telephone."—*John I. Sabin.*

The German Government is considering the question of furnishing night telephone service in some of the larger cities throughout the Empire. At present no service is furnished during the night.

An ordinance has been introduced in the Louisville, Ky., Common Council requiring telephone companies to pay a license tax of $4 per year per telephone to the sinking fund. It is not believed that the measure will pass.

The citizens of Chippewa Falls, Wis., met in a mass meeting the other night and, as a consequence of the raising of rates of the local telephone company, unanimously ordered all the instruments out. The town to-day is without telephones. It is said that an independent line will be in operation at once.

The city of Racine, Wis., has granted a telephone franchise to Allen Shewman. The provisions of the ordinance are stringent, the price for business telephones to be $30 and for residences $18 a year; that the system shall be completed in a year; and that 350 telephones shall be in operation.

It was stated the other day by Judge Thomas that the committee of the Illinois, Indiana, Michigan, Ohio and Pennsylvania independent telephone interests appointed to undertake the acquisition of a franchise in Chicago have practically closed the deal. A movement is on foot among the independent companies in the states named above to build a network of long-distance lines through that territory.

During September the Erie Telephone Company made a net gain of 3,689 subscribers, and for nine months 32,347, making the total connected September 30, 95,090. The Central Union gained 1,533 for August and 11,609 for nine months, making the total subscribers September 30, 56,625. The Pacific Coast gained 1,783 for September, and 13,501 for nine months, making the total subscribers September 30, 58,486.

The claim of a subscriber to telephone service to recompense for damages due to negligence on the part of operators, which is the basis of a suit for $150 against the Central Union Telephone Company at Indianapolis, is believed by certain attorneys to be a legal and valid ground of action. The Indianapolis case is the first of its kind to attract attention. Telephone people believe that damages could not be assessed in a case of this kind unless malice and purpose could be proved.

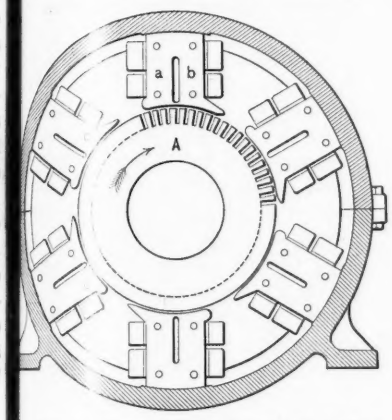
The Ohio Valley Telephone Company, whose lines cover Louisville, Ky., and contiguous territory for a radius of 75 miles, recently passed under the management of the Cumberland Telephone and Telegraph Company. By a recent purchase of stock the directors of the latter company secured a majority of the stock of the Ohio Valley Company. The executive officers of the two companies were made the same and the company was merged into the larger corporation. The following are the officers of the new company, which still retains its name. President, James E. Caldwell; vice-president, W. W. Berry; treasurer, Leland Hume. The board of directors selected George G. Hall as general superintendent of the company, with headquarters at Louisville. Mr. James E. Caldwell will be general manager, with headquarters at Nashville. He takes the place of Capt. H. N. Gifford, who retires.

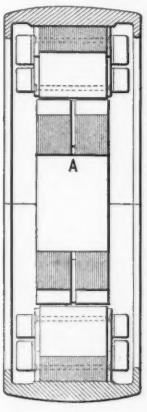
The rural telephone service is said to be most advanced in the western reserve counties of northeastern Ohio. In some of these counties not only is there a telephone office in every township, but hundreds of farmers have telepones in their homes. One of the companies is strictly a farmers' company, it being operated by eight farmers, who own everything from franchise to switchboard. The primary object in constructing the lines was not to build them for an investment, but as a help in the transaction of business and to give the families some of the social privileges that are too often lacking on the farm. The rental price of a telephone is only $12 a year in advance, or $1.25 by the month, and this entitles the subscriber, his family, hired help and guests to the free use of the lines and those with which the company has reciprocity contracts. The low rate or rental is made possible in the country only by placing several telephones on each circuit, usually one street or neighborhood being on the same wire.

A New Type of Direct-Current Dynamos.

The accompanying illustrations represent the details of construction of an improved type of dynamo, which has been designed to obviate the difficulties due to a shifting point of commutation under changing loads. It is highly desirable, as every one who has operated isolated plants knows, to make the regulating action of the dynamo as automatic as possible. The ingenious method exhibited here is incorporated in the new type Lundell generators manufactured by the Sprague Electric Company, of New York.

The effect of armature current in its reaction upon the magnetic poles of a dynamo is well understood. While the demagnetizing tendency of this current can be amply compensated by compounding, the distorting action shifting the line of commutation can not easily be offset in this way. Perhaps the most practical solution has been the employment of very strong fields, but this necessitates the consumption of much material in the construction of the machine, and involves necessarily wasteful and expensive design. Figs. 1 and 2 show cross-sections of the new dynamo. It will be seen that the pole-pieces have a peculiar shape, a horn running down in the direction of rotation of the armature, while the pole-piece itself is nearly cut in two by a deep slot parallel with the lines of magnetic flux. The core on the side toward the shoe has a much larger area facing the armature than the other. Hence, under a given magnetizing force, the core on that side will become saturated first and remain at a practically steady magnetization. Hence, if the machine is so proportioned that the following side of the field poles is saturated from the shunt coils, the effect of increasing magnetization, due to the series coil, will practically be confined to the pole-piece having the least face. This tends to pull back the centre of flow of magnetic induction in a way that compensates exactly for the distorting effect of the armature current. The machines are said to run with no perceptible sparking and to regulate admirably under highly difficult conditions of use.





FIGS. 1 AND 2.—CROSS-SECTIONS OF A NEW TYPE OF DIRECT-CURRENT DYNAMO.

FIG. 3.—SPLIT POLE WITH WINDINGS OF A NEW TYPE OF DIRECT-CURRENT DYNAMO.

Counting the People by Machinery.

Our first census, made in 1795, showed the population of the United States to be 5,000,000, and the count cost Uncle Sam, who was comparatively poor then, one cent for each person. It is estimated that the twelfth census, to be made in June, 1900, will show that our people number 75,000,000, and that the item of clerk hire, in the Census Bureau alone, will exceed $5,000,000. Clifford Howard, writing of "How the Next Census Will Be Taken," in the November *Ladies' Home Journal*, says that "although the work of enumeration will be completed by July 1, it will probably be two or even three months later before the last of the schedules are received at the Census Office; for not only must they all be first examined by the supervisors, but in many cases they will probably require revision because of some error or informality. The actual counting of the people will not be done until the schedules are turned into the Census Office. The enumerators simply gather the facts, and the office force in Washington does the counting and the compiling, which is done by electricity. In 100 days all the facts relating to 75,000,000 people will be tabulated."

Sealed proposals will be received on November 3 for wiring Memorial Hall at the United States Military Academy, West Point, N. Y.

The Transportation Facilities of Paris.

The Hon. Thomas B. Reed, ex-Speaker of the House of Representatives, has written for the *Saturday Evening Post*, of Philadelphia, a series of ten papers on "Paris and French Justice." In the first paper, Mr. Reed characteristically describes the transportation facilities of Paris as follows:

"Of course, in a great city of more than 3,000,000 inhabitants, the first problem is the problem of transportation, the way of getting about. Two thousand streets scattered over 200,000 acres of ground, making a great circle six miles in diameter; streets slowly built up through centuries of growth, gradually spreading out from the old island which is still the centre; streets which, in early days, followed cow-paths as steadily as ever they did in Boston, bursting out in time into broad boulevards and mile-long avenues, are not so easily placed at everybody's disposal as the squares of Philadelphia and of Chicago, which are paralleled for miles by all the streets needed to make the full breadth of great cities destined to surpass Paris and rival London.

"The great and striking difference between their system and ours is the ample provision we make for every traveler to go everywhere at a price which would be small even in a land where the standard is a franc, which is one-fifth of a dollar. There, few or no electric cars whirl through the streets, rivaling in speed and comfort the carriages of the rich. Hardly a horse-car can be seen, and, even on the few avenues where they run, you may wait a solid half-hour before one will appear going your way. From the old church of St. John of Bellville goes a little narrow-gauge cable road, which they call the *fenicular*, to the square near by. Speaking generally, for there may be two or three exceptions to the broad statements I have made, the only method of transportation for the poor is the omnibus, which is operated on a system which it would be a liberal education to understand, and, to insure peace of mind, requires the constant possession of an accident policy.

"Even after you understand the connections, there are many chances that you can not continue your journey, for, if there be a full carload before your ticket is called, you can never get aboard. We are very indignant, and justly so, about our crowded cars, and the preternatural activity of the conductor who seems bound to see how many times he can weave in and out among the helpless and hapless beings who are hanging to the straps; but, if you are in Paris, in a hurry, and can not even have the poor privilege of standing up, you have your doubts whether your wrath at home has always been the wrath of the righteous."

A Loving Cup Presentation.

Mr. Charles T. Hughes, the manager of the New York office of the General Electric Company, was the recipient of a handsome loving cup on Saturday afternoon, October 21, from all the members of his staff. The occasion of the presentation was the fact that on that day twenty years had elapsed since he first entered the employment of Mr. Thomas A. Edison. Since that time Mr. Hughes has been continuously in the employment of Mr. Edison or his successors, which have now been merged into the General Electric Company.

The cup was made of Dorflinger green glass with heavy sterling mountings and the usual three handles. Around the outside of the rim were the inscriptions:

"Charles Turner Hughes, from his Staff." "Thomas A. Edison, October 21st, 1879." "The General Electric Company, October 21st, 1899." On the inside of the rim was "Twenty Years of Active Service."

Mr. Theodore Beran, manager of the supply department of the New York office, made the presentation speech in Mr. Hughes's office, and Mr. Hughes responded for himself and Mrs. Hughes, who was also present.

During the afternoon Mr. Hughes received the personal congratulations of Mr. C. A. Coffin, president of the General Electric Company; General Eugene Griffin, first vice-president of the General Electric Company, and many others. He also received congratulatory telegrams from members of his own staff in Buffalo, Syracuse and New Haven, who were unable to be present.

Consolidation of Electric Lighting Interests in Brooklyn, New York.

A consolidation has been effected between the Kings County Electric Light and Power Company and the Edison Electric Company, of Brooklyn, New York, by which the former absorbs the latter, though the apparent arrangement is a thirty-eight-year lease of the property and franchises of the Kings County company to the Edison company.

The consideration for the lease is that the Edison company shall pay all of the operating expenses and fixed charges of the Kings County company, and that whatever surplus is left shall be paid to the Kings County company, to be used as dividends upon its stock at the discretion of its board of directors. The object of the lease, it was stated, was to bring about a greater compactness in the operating of the electric lighting business in Brooklyn and to do away with double taxation of franchises.

The Edison company, at a special meeting of the stockholders on October 30, passed resolutions merging the Municipal and Citizens' companies. As a result of this merger it was estimated that there would be a saving of between $60,000 and $70,000 a year.

Mr. A. M. Young, the organizer of the Kings County company, stated that it had a surplus of $190,000, which represents a nine per cent dividend. Within the next three years the company, he thought, should be earning twenty-five per cent on its capital. It is a magnificent property and possesses rapidly developing prospects.

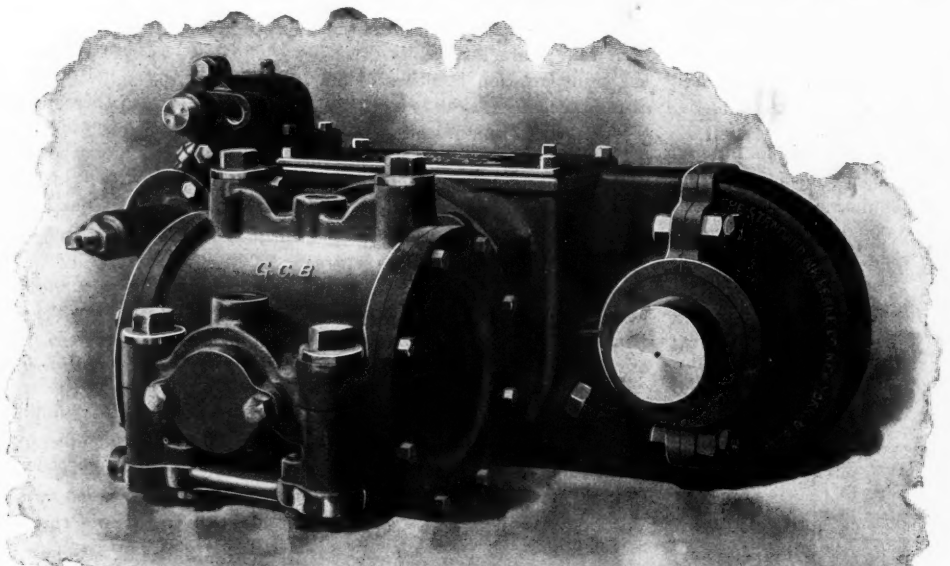


FIG. 1.—"STANDARD" AXLE-DRIVEN AIR-COMPRESSOR FOR STREET CAR AIR-BRAKES.

Wall Street and the Electrical Stock Market.

The monetary situation in Wall street constituted the only barrier to a general rise in prices during the past week. On the New York Stock Exchange General Electric closed the week at 121½ bid and 122½ asked. Metropolitan Street Railway, of New York, closed at 197½ bid and 198½ asked. Third Avenue Railroad, of New York, closed at 155 bid and 157¾ asked. Brooklyn Rapid Transit closed at 86 bid and 86⅛ asked. On the Boston exchange American Bell Telephone closed at 370 bid and 373 asked. On the Philadelphia exchange Union Traction closed at 38⅞ bid and 38½ asked. On the curb or outside market in New York Electric Vehicle closed at 76 bid and 81 asked. Electric Boat closed at 20 bid and 21 asked.

Wall Street, Oct. 28.

Dr. J. Mount Bleyer, of New York, has been invited to deliver an address on "Electro-Physiology" before the International Congress of Electricians, which meets at the Paris Exposition during August, 1900. The International Medical Congress will meet in the same city a week earlier.

A New Battery.

A battery that can be carried in stock, ready for use, without any deterioration through time or unfavorable climatical conditions, has long been sought for. The United States Battery Company, of Brooklyn, N. Y., have devised in the "U. S. B. No. 2," a storage battery of high efficiency, low internal resistance, and which is said to have none of the disadvantages attendant upon the use of primary or dry batteries, such as evaporation, polarization and formation of obnoxious and detrimental sulphates. The active elements, securely sealed in a separate package, retain their valuable properties until ready for use. They are then placed in conjunction with the electrodes and remain for the usual time active and energetic.

Another advantage found in the "U. S. B. No. 2" batteries is their ability to retain their high electromotive force until the full capacity has been drawn from them. The voltage remains constant, it is claimed, no matter what discharge rate up to one ampere per cell is employed. This fact alone will commend it for all work where a high voltage is required for short durations of time and where it is necessary to obtain a strong, heavy current.

The "U. S. B. No. 2" batteries are especially adaptable for small motor work, such as is required for fans, dental work and surgical work, phonographs, musical instruments, and all mechanical devices capable of being operated by small motors.

For electrically lighted contrivances with miniature, candelabra and larger size lamps, these batteries are said to be superior. They are admirably suited for fire and burglar alarms, telegraph, telephone and teleseme work, annunciators and bells, and are claimed to have great advantages for experimental and laboratory work. They are capable of holding their charge for a reasonable time, and when exhausted may be recharged as often as necessary.

The following figures of efficiency are given by the manufacturers: Voltage, open circuit, 2.5; closed circuit, 2.35. Capacity, ampere hours, 5. Discharge rate in amperes, normal, ½; safe maximum, 1. Recharge rate, 1½ amperes for 3½ hours. Weight of elements, 17¼ ounces. Weight of cell complete, 2 pounds, 1 ounce.

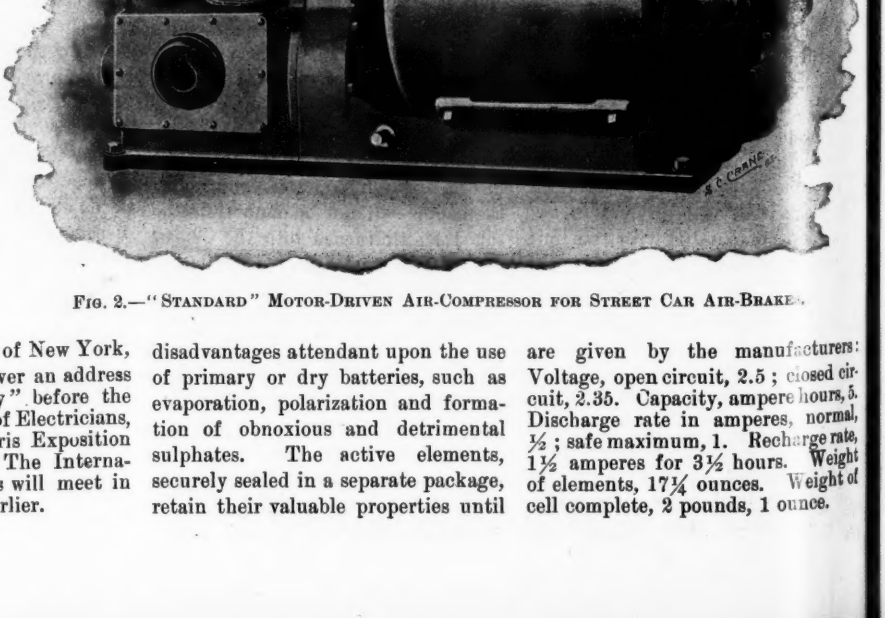


FIG. 2.—"STANDARD" MOTOR-DRIVEN AIR-COMPRESSOR FOR STREET CAR AIR-BRAKES.

Air-Brake Equipment for Street Railway Cars.

The advantages of independent power brakes for street cars were never so evident as they are now in this day of high-speed and heavy-weight cars. The operation of air-brakes is familiar to most, the difference between one system and another being largely a matter of detail; but this detail is the controlling factor which determines success.

THE STANDARD AIR-BRAKE COMPANY'S SYSTEM.

The illustrations show two types of air-compressors for street railway cars. Fig. 1 is an axle-driven pump, the machine being geared to the axle of the car. A split spur-gear keyed to the car axle drives a gear which is mounted free on the pump shaft. The face of this latter gear is provided with the female half of a combined cone and positive clutch, the male half of which is mounted on the squared part of the pump shaft. The latter half of the clutch is moved into and out of engagement by a lever, which is operated as described below. The compressor proper, on the extension of the shaft carrying the clutch, is bolted to the housing so that it forms an oil-tight continuation of the same, and all parts are lubricated by the heavy oil placed in the housing. The piston is double acting and of simple and durable construction; it is provided with efficient packing, and as it does not exceed a speed of sixty feet per minute, and is idle a very large percentage of the time, the wear of a year's hard service is said to be hardly appreciable. All four valves are interchangeable and are provided with removable seats. The apparatus which automatically throws the clutch in and out consists of two parts. The lower, called the operator, has a spring which, acting on a cross-head, always tends to throw the clutch in. Opposed to this spring is a piston of such diameter that when air is admitted to its cylinder the spring pressure is overcome and the clutch thrown out. The upper part, called the governor, admits air to the operator cylinder when the predetermined maximum pressure is attained in the reservoir, which, as explained above, throws the clutch out and the compressor stops working. When, after an application, the air in the brake cylinder is released, it passes into a chamber of the governor, and this pressure, assisting the spring, causes the release of the air in the operator cylinder, so the spring of the latter throws the clutch in, although the reservoir pressure may have been reduced but a pound or two; thus there is maximum pressure for all stops when they occur 100 feet or more apart. The exhaust air also lifts the suction valves, so there can be no load on the pump piston at the moment when the clutch is thrown in, thereby making the starting of the compressor easy. The air escapes through the suction screen and blows off any dust that may have collected on the outside. If the pressure in the reservoir is reduced ten or fifteen pounds, the governor, without the aid of exhaust air, will cause the clutch to be thrown in, but the action is said to be of rare occurrence and would indicate the presence of serious leakage in the pipe system.

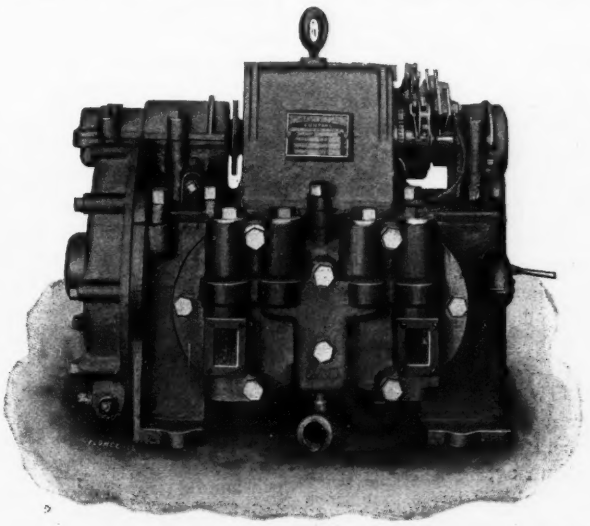


FIG. 3.—CHRISTENSEN COMBINED MOTOR AND AIR-COMPRESSOR FOR STREET CAR AIR-BRAKES.

FIG. 4.—CHRISTENSEN ENGINEER'S VALVE AND PIPING FOR AIR-BRAKES ON ELECTRIC CARS.

The other type of compressor illustrated is motor-driven. The motor is built to run at 750 revolutions per minute, and is geared, through a 1 to 5 reduction, by a rawhide pinion to the compressor. This is of the compound type and, owing to pressure being on the smaller piston all the time, the gears are continually held in contact The result is that this apparatus runs with remarkably little noise or vibration, and, as would be expected with a compound compressor, the cylinder efficiency is very high, being stated at 88 per cent for a pressure of 60 pounds per square inch, and almost as good for 90 pounds. This is said to be at least 40 per cent better than can be attained by short-stroke, single-stage compressors.

This apparatus, with a large variety of other air-brake mechanism for street and other cars, is built by the Standard Air-Brake Company, of 168 Broadway, New York city.

THE CHRISTENSEN ENGINEERING COMPANY'S SYSTEM.

Fig. 3 shows another type of combined motor and air-compressor. The base of the motor forms the top cover for the compressor. The gears are at the left hand end in the illustration, and are enclosed in casing and run in oil. In the compressor base is a cavity partly filled with oil, which keeps all parts of the machine constantly lubricated. This whole outfit is mounted underneath the car body and is appropriately connected with the platform valves and brake cylinders which supply the air pressure to the brake shoe. Fig. 4 shows the arrangement of the engineer's valve, gauge and piping in the vestibule of an ordinary electric street railway car. It is possible to apply these brakes so that the pressure on the shoes is gradually increased, bringing the car to a gentle stop without shock. This may be accomplished without waste of air. In the emergency position of the valve a full and unobstructed passage permits the compressed air to flow from the main receiver into the brake cylinder, setting the brakes instantly and with maximum force.

The Christensen Engineering Company, Milwaukee, Wis., which manufactures these brakes and a complete system of air-braking apparatus, strongly recommends air-whistles instead of the familiar gong for high-speed suburban cars equipped with air-brakes. The whistle may be operated by the motorman's foot in the same way as the ordinary gong is worked, but can be heard much further and gives a much more satisfactory warning at grade crossings.

ELECTRIC LIGHT FLASHES.

The Wyandotte, Mich., electric light question is still unsettled.

The question of issuing $8,000 electric light bonds is under consideration at Lowellville, Ohio.

The City Council of Baker City, Ore., has been petitioned for a five-year electric light franchise.

A larger engine is being put in and other improvements are being made at the plant of the Stroudsburg, Pa., Electric Light Company.

Cassius M. Conrad has been appointed receiver of the Sycamore, Ill., Electric Light Company, on the petition of one of the stockholders.

The City Council of Osceola, Iowa, has decided to call an election to vote on the question of issuing $45,000 bonds for a water and light plant.

A press report from Austin, Tex., says that candles and coal oil are at a premium there, the municipal electric light station being completely shut down.

James A. Blair, James H. Frost and William H. Lucas are asking a franchise for a new electric light and power plant to supply customers, public and private, throughout Kansas City, Mo.

At Riverside, Cal., on November 7, bids will be received for an electric light plant for the Southern California Hospital. J. McGonigle is chairman of the committee having the matter in charge.

The property of the Greenville, Tex., Water and Electric Light Company was recently sold to Mr. C. F. Street, of New York, representing the bondholders. The price paid was $31,000, or less than 50 per cent of the bonded indebtedness against the plant.

E. C. Lombard & Company, of Jackson, Mich., have made a proposition to light the streets of the city of Kalamazoo, taking the municipal lighting plant and furnishing 250 lights for five years. The matter is in the hands of a committee of the Common Council.

The Electric Company, of Connellsville, Pa., is now making improvements on its large plant, which, when completed, will cost about $15,000, making the plant worth about $90,000. The service will be much enlarged and improved by the additional machinery, which will be placed and in running order by the end of October.

The work of installing the boilers for the city lighting plant in Joplin, Mo., is in progress. The poles are all up except on three streets, Main, Joplin and Virginia streets, where iron poles are to be erected as soon as they arrive. The foundations for the engines and dynamos are ready, and if there is not too much delay in the shipment of the machinery and poles, it is predicted that the plant will be in operation early in November.

The Pana (Illinois) Electric Light and Power and Street Railway Company, with which is combined the Pana Telephone Company, had an election of officers on October 9, resulting as follows: C. H. Rawlins, president; H. J. Froelich, vice-president; S. K. Gregg, secretary and treasurer and purchasing agent; F. A. Kuehnel, formerly of the Chicago Edison Company, manager. It contemplates making large extensions both in lights and telephones, and will appreciate it if manufacturers will send their catalogues.

The Cordoba Electric Light and Power Company, advices from Rosario, Argentina say, is negotiating for the installation of an electric light and power plant at Rosario. The same company, which is said to be successfully operating at Cordoba with a water-power plant, is also negotiating for a large water-power undertaking at Tucumson. At Rosario no water-power being available, a steam plant is proposed. The company has, through Mr. Charles Bright, an American engineer, entered into negotiations with a London syndicate for the necessary capital. It will be remembered that Mr. Bright has made extensive purchases in this country for similar undertakings, therefore it is reasonable to suppose that for these plants he will bear American concerns in mind.

LITERARY.

Mr. Alfred Stieglitz, probably the best known and most skillful amateur photographer in the world, writes in *Scribner's Magazine* for November, of "Pictorial Photography." He points out the difference between the artist's and the mechanic's attitude toward the camera, and shows how dependent upon individual taste and skillful handling is the best work of the modern photographer. Illustrations from a number of his own negatives and specially manipulated prints have much of the quality usually associated only with brush-work.

ELECTRIC RAILWAY NOTES.

The Maumee Valley Electric Railroad Company proposes to extend its lines to Waterville, Ohio.

Additional franchises have been granted to the Danville, Va., Street Railway Company; $250,000 will be expended to improve the line, which has been purchased by Richmond parties.

The Kanawha Traction and Electric Company, at Montgomery, W. Va., has secured a perpetual right of way from Kanawha Falls to Coalburg in West Virginia, a distance of eighteen miles, and traversing one of the largest coal-producing regions in the United States. The road will be built at present only from Mount Carbon to Hundley, a distance of seven miles, in which there are no less than sixteen coal mines tributary to the road, which will handle their employés and small freights. The specifications for the line are now being prepared, and bids will shortly be received at the offices of the company in Montgomery.

John Waters has received the contract to erect four of the new factory buildings for the United Railway and Electric Company in Southwest Baltimore, Md. The buildings to be erected at once, include a car barn, paint shop, erecting shop and storage house, at a cost of about $550,000. The contract for the other buildings, which will include a motor-erecting shop, cabinet shop, mill shop, power house, two machine shops, armature room and two blacksmith shops, will be awarded as soon as the plans and specifications are completed by Messrs. Baldwin & Pennington, architects, under whose supervision the buildings will be erected. The entire cost of the buildings and equipment will be about $1,000,000.

Municipal Ownership Didn't Pay.

Director of Public Improvements Kauffman, of Columbus, Ohio, has issued a statement of the expenses of the municipal lighting plant, which shows that the expense of furnishing light by the municipality is little, if any, less than was formerly the case when the lights were furnished by a local company. The total expense of furnishing the 400 lights operated by the city will average close to $70 per light, which is but slightly less than the former cost. The municipal plant was operated by water-power at a needlessly great expense. He hopes to instal a plant which will furnish the same amount of light at an average cost of $50 or less per lamp.

The New York Electrical Society.

With a view to the more effective conduct of the work of the New York Electrical Society, the following committees were formed at the executive committee's opening meeting of the season 1899–1900: Papers and meetings, Dr. C. A. Doremus, Stephen L. Coles; membership, F. A. Pattison, H. V. Henshaw; finance, Charles Blizard, Arthur Williams; constitution and by-laws, F. A. Pattison, Arthur Williams, H. A. Sinclair.

These committees are already at work, and it is confidently predicted that in such hands the affairs of the society will attain a prosperity even exceeding its fine record of the last two years. It is worth recalling that last season the average attendance at the meetings of the society was over two hundred. The list of the meetings, which is appended, shows the character of the work which the society has been so successfully carrying on of late:

Opening meeting of the season, 1898–1899, at Pearl street, Brooklyn, station of the Edison Electric Illuminating Company of Brooklyn; address by W. S. Barstow. Lecture on Surface Contact Railways, with Special Reference to the Johnson-Lundell System, by Edward H. Johnson. Ideas underlying the Organization of the Volunteer Engineer Corps: the Work accomplished by it in Puerto Rico, and the Opportunities of Further Usefulness, by Colonel Eugene Griffin, First Regiment of the United States Volunteer Engineers; addresses were also given on Electrical and Engineering Work in the Navy during the War, by Lieut. W. D. Weaver and F. W. Roller. Lecture on Latest Progress of Storage Battery Installations, by Jos. Appleton. Paper on the Motor Vehicle in Commercial Operation, by G. Herbert Condict; address by F. W. D. Crane. Lecture on Modern Research and Lightning Phenomena and Building Protection, by W. J. Jenks; address on Original Investigation into the Protection of Electrical Circuits from Lightning, by A. J. Wurts. Lecture on Electricity at High Pressures, by Professor Elihu Thomson. Lecture on Electrical Engineering in Office Buildings, by Reginald Pelham Bolton. Celebration of the Volta centennial at Madison Square Garden; addresses by Cav. G. Branchi, representing the Italian Government; J. W. Lieb, Jr., G. Torchio, F. W. Jones and Dr. Ogden Doremus, and messages to the Italian Electrical Society, Milan, and the Volta Electrical Exhibition at Como. Annual meeting at Madison Square Garden; lecture on the Future Possibilities of Wireless Telegraphy, by W. J. Clarke.

The Wayne Hotel, at Fort Wayne, Ind., is to have an isolated electric plant of 400 lights capacity.

American Railroads.

Mr. George H. Daniels, general passenger agent of the New York Central & Hudson River Railroad Company, and a railroad man of experience and authority, read a paper entitled "American Railroads: Their Relation to Commercial, Industrial and Agricultural Interests," before the International Commercial Congress at Philadelphia on October 25. Some extracts from this interesting paper follow:

It is beyond question that American railroads to-day furnish the best service in the world, at the lowest rates of fare, at the same time paying their employés very much higher wages than are paid for similar service in any other country on the globe.

In the United States the first-class passenger fares last year averaged 2.14 cents per mile, although on some large railways the average was several miles less than two cents per mile. In England the first-class fare is four cents per mile; third-class fare for vastly inferior service is two cents per mile, but only on certain parliamentary trains.

In Prussia, the fare is 2.99 cents per mile; in Austria, 3.05 cents per mile, and in France, 3.36 cents per mile.

Our passenger cars excel those of foreign countries in all that goes to make up the comfort and convenience of a journey. Our sleeping and parlor-car system is vastly superior to theirs. Our baggage system is infinitely better than theirs and arranged upon a much more liberal basis. American railroads carry 150 pounds of baggage free, while the German railroads carry only fifty-five pounds free.

The lighting of our trains is superb, while the lighting of trains on most foreign lines is wretched.

I may be pardoned for citing two examples of what I mean by the unsurpassed passenger train facilities of American railways.

A single locomotive recently hauled a passenger train of sixteen cars, nine of which were sleeping and parlor cars, from New York to Albany, a distance of 143 miles, in three hours and fifteen minutes, which is forty-four miles per hour, and is the regular schedule time of this train. The train weighed 1,832,000 pounds and was 1,212 feet, or nearly a quarter of a mile, long.

The Empire State Express has for years been making the run from New York to Buffalo, 440 miles, in eight hours and fifteen minutes, an average speed of fifty-three and one-third miles an hour, including four stops—two of them for changing engines—and twenty-eight slow-downs, on account of running through incorporated towns and cities.

For one stretch of twenty-two miles, another of seventeen miles, another of sixteen miles, and another of sixty miles, the regular schedule time is exactly sixty miles an hour. For one stretch of twelve miles it is 63.40 miles an hour. For another stretch of nearly ten miles it is 64.86 miles an hour.

The weight of this train is 608,000 pounds, and it has seating capacity for 248 passengers.

These are some of the achievements of American railways in passenger service that have not been approached in any other country on the globe, and in my opinion it is achievements of this character that have made it possible for the United States to expand its commerce with such astounding rapidity.

The fact that American passenger service attracts the attention of people of every other country who visit our shores is demonstrated by the desire of all foreigners to ride on the Empire State Express, the fastest long-distance train in the world, and the further desire to examine the magnificent machines that haul our great trains.

Enclosed Rheostats.

The enclosed type of rheostat has become the favorite type for motor starters during the past few years. In the most approved form the resistance material is in the form of a reflexed ribbon which is embedded in sand, which is the filling material of a shallow box made entirely of iron, or having one face of slate.

A patent was issued October 24, 1899, to H. Ward Leonard, of New York, which thoroughly covers the essential features of this form of rheostat box. The patent contains twenty-eight claims, and a typical claim reads as follows:

Claim 23. "In a resistance box, the combination of a box having two large parallel surfaces and a relatively narrow edge, one of the large surfaces being in the form of a cover, a resistance within the box arranged in steps or sections, terminals to which said steps or sections are connected, and a removable filling of mineral insulating material surrounding said resistance."

A New Type of Desk Telephone.

The instrument shown in the illustration is a new type of desk telephone which is adapted to connect with various different styles of interior and exchange services. The terminal block to which the line wires and conducting cord are attached also contains the induction coil, which is thus removed from possible injury, and the absence of which enables the desk part of the instrument to be made in the neat and simple way shown in the illustration. The spring for the hook is flat instead of being of the usual spiral form, an innovation which will be appreciated on account of the greater strength thus brought to the apparatus. The transmitter is so attached that only two screws need be loosened to remove it from the standard, while the terminals for the leading-in cords are on an insulated block in the base, and take the form of binding posts, rendering it unnecessary to unsolder any connections when renewing the cord. The instrument is made by the Connecticut Telephone and Electric Company, of Meriden, Ct.

A NEW TYPE OF DESK TELEPHONE.

TELEGRAPH NOTES.

The Dominion Government is building lines in British Columbia and the Northwest Territory, so that Dawson and Atlin will soon have direct communication, not only with Skagway, but also with the outside world through the British Columbian system of wires by the filling of the gap between Atlin and Quesnelle, B. C.

At the annual meeting of the stockholders of the Western Union Telegraph Company the following new directors were elected to fill vacancies: George Coppell, William Lanman Bull, James H. Hyde, Morris K. Jesup and Frank Jay Gould. The annual report for the fiscal year ended June 30 shows a surplus over interest and dividends of $103,693, against $315,694 in the previous year.

Secretary Root has made answer to the petitions of the Commercial Cable Company asking permission to land a cable in Cuba, stating in substance that the War Department has nothing to do with this matter, nor has any executive branch of the government. Congress having prohibited the granting of franchises in Cuba, there is no power vested in any one without further Congressional action to give this company the right to land its cable in Cuba. It is stated in the newspapers, however, that the company will make a test case by laying its cable anyhow.

At Bangor, Me., the Western Union Telegraph Company's lines are fed by current from the town lighting system, replacing 3,000 cells of battery that were formerly in use at that point. Their consumption was formerly two and one-quarter tons of vitriol a year and about 10,000 zincs annually. The through cable line, of which Bangor is the half-way station, running from New York city to North Sydney, Cape Breton Island, had its battery at this point. This is a line of special copper wire a little more than 1,200 miles long. It is understood that a small battery of accumulators will be installed to tide the plant over a possible break-down of the electric light station.

The International Commercial Congress.

The Philadelphia Commercial Museum issued very handsome invitations for the opening exercises of the International Commercial Congress, taking place October 12. This was a conference for the advancement and extension of trade, and was held in the large hall of the National Export Exposition at Philadelphia.

THE SPRAGUE ELECTRIC COMPANY.

A CHANGE OF OFFICERS—NO CONSOLIDATION WITH THE STANLEY COMPANY.

At the meeting of the directors of the Sprague Electric Company, in New York, October 29, new officers were elected as follows:

President, John Markle.

First vice-president, E. C. Platt.

Second vice-president, Frank J. Sprague.

Secretary and treasurer, C. P. Geddes.

General manager, Allan C. Bakewell.

A new executive committee was elected, composed of the following-named gentlemen: John Markle, John E. Searles, Albert B. Chandler, E. C. Platt and F. O. Briggs. Mr. Briggs, who is of Trenton, N. J., goes on the board of directors in place of John O. Stevens. This is the only change in the directorship.

The consolidation of the Sprague Electric Company and the Stanley Electric and Manufacturing Company, of Pittsfield, Mass., which had been contemplated, was not agreed to, and the companies will be operated independently, although, to some extent, owned by the same individuals. Mr. Henry Hine will continue as general manager of the Stanley company.

LATE NEWS.

A verdict for the use of automobiles in Central Park was rendered Tuesday of this week by Magistrate Olmstead, who discharged Winslow E. Buzby, who had been arrested for attempting to run his automobile in the driveways of the Park. Alderman Stewart M. Brice has introduced a resolution in the Board of Aldermen granting automobiles the right to run in the Park under certain restrictions.

A great financial organization, to be known as the Continental Telegraph, Telephone and Cable Company, organized under the laws of New Jersey, with headquarters in the American Surety Building, New York city, is reported. The capitalists said to be interested are George Gould, John Jacob Astor, William C. Whitney, P. A. B. Widener and William L. Elkins. The combination is to include the independent telephone companies of the country, and both the telegraph companies and the five Atlantic cable companies. Mr. Martin Maloney is said to have engineered the enterprise. Mr. Widener, in an interview in the Philadelphia *North American*, verifies the above report.

A New Telephone Factory.

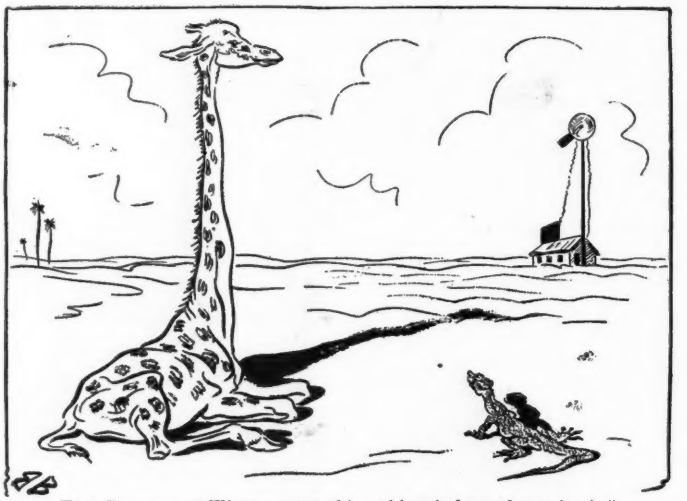
What promises to be one of the most complete and finely equipped manufacturing establishments in the country is now in course of erection near Chicago for the Western Telephone Construction Company. It is to be situated upon five acres of ground, and provision will be made for manufacturing the entire product necessary for all classes of modern telephone exchange and toll-line apparatus. It is contemplated that every part will be worked from the raw material to the finished product in this new factory. The establishment will give employment to 400 people, with provision for an increase. It will, therefore, be about double the capacity of the company's present factory, which is claimed to be the largest independent telephone manufactory in the United States.

Texas Telephone Property Assessed.

The county commissioners at Austin, Tex., have assessed the intangible property and franchise of the South Texas division of the Southwestern Telegraph and Telephone Company, placing the value of same at $450,000 per annum for the past three years. The South Texas division is described as all that property south of a line drawn from east to west across the state, passing through the city of Waco. The Texas Telegraph and Telephone Company was valued at $15,000 per annum for the past three years for taxation.

GOSSIP OF THE DESERT.

[*From Scribner's Magazine.*]



THE GIRAFFE—"What a great thing this wireless telegraphy is."
THE LIZARD—"Yes, indeed; are you a sending or receiving station?"

Electric Heating Apparatus.

The illustrations shown herewith represent some new types of electric heating apparatus. Fig. 1 shows what is called a disk heater, or portable stove, and is designed to heat anything that can be set on a perfectly flat surface, such, for example, as a coffee-pot. Figs. 2 and 3 represent polishing and tailors' irons, respectively. These irons maintain a constant temperature and are always ready for use, no time being lost in shifting them, nor is there any danger of burning the fabric upon which they are employed. Fig. 4 represents a soldering iron electrically heated, which possesses the same advantage of ease of use and continuous maintenance at the proper temperature as the smoothing irons described above. Fig. 5 represents a little instrument which will be appreciated by the fair sex, as it is intended for heating curling-irons. The irons are thrust into the hole in the end of the tube, and in a few minutes are just hot enough, there being no danger of heating them to a point where they will burn the hair. Fig. 6 shows a plate-warmer, consisting of an oven-shaped box into which plates are put to be heated or kept hot, and where they are, of course, entirely free from dust, etc. Fig. 7 represents a radiator or air heater for warming air in rooms. This is intended for domestic use and to be utilized in bath-rooms, sick-rooms, etc., where it is desirable to warm the air locally and specially. All of these instruments are made for constant-potential circuits up to 220 volts, and are manufactured by the United Electric Heating Company, of Detroit, Mich.

FIG. 1.

FIG. 2.

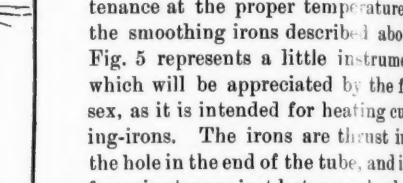


FIG. 3.

FIG. 5.

FIG. 4.

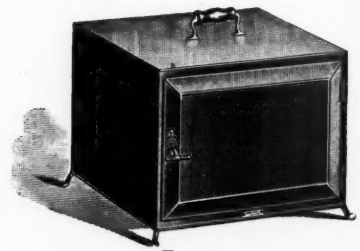


FIG. 6.

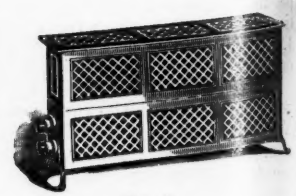


FIG. 7.

ELECTRIC HEATING APPARATUS.

Recent Development in Marine Generating Sets.

The requirements of marine work are most difficult to fill. Not only is space economized to the last degree, but into this curtailed space must be built a machine which will have unusual capacity when speed and weight are considered, and be thoroughly reliable.

The combination illustrated in Fig. 1 consists of a Bullock type "N-I" generator direct-connected to a Forbes marine engine.

The engine cylinder is 5 by 5 inches, and is made for the high pressures of modern marine practice. The cylinder is supported upon three hollow steel legs which are rigidly fastened to a sub-base common to both engine and generator. To two of these supports the cross-head guide is securely bolted. Means are provided to adjust for wear of the cross-head shoe and guide and in the main bearings. A system of sight-feed lubricators is installed upon the side of the cylinder with copper tubes leading to all of the wearing surfaces of the engine.

A small balance wheel is provided and assists in the regulation of the engine speed. The governor, which is installed on the outer end of the shaft, is of the inertia-centrifugal type and maintains a speed between no load and all load limits said to be of less than two per cent variation. The valve is of the cylindrical balance type and gives a nearly perfect steam distribution.

The generator, like the engine, is very compact, pleasing in outline and

Fig. 1.—Marine Generating Set.

presents some excellent features of mechanical and electrical design, as will be seen by consulting the sectional engraving, Fig. 2.

The yoke is a steel casting of the conventional circular form having inwardly projecting pole-pieces of laminated soft steel. Each pole is bolted to the frame by two bolts *A A*, the centrally located rivet *B*, of the laminated pole *C*, being tapped and serving as a nut for the bolts.

The armature core *D* is built up of laminated soft steel mounted directly upon the shaft and held firmly together by iron end plates *E* and nuts *F* as shown, one end plate resting against shoulder *G*. Ventilating slots *H*, perpendicular to the shaft, provide a means of ventilation. The windings *I* are machine formed and hot pressed, and are insulated before being placed in the slots of the core. The windings are held in place by steel wire bands wound in slots, making a flush finish with the outside of the laminated core. The armature shaft rests in a phosphor-bronze bearing of liberal dimensions at the outer end, and is key-seated in the hub of the engine flywheel, which is of extra width and provided for receiving the end *K*. An oil shield *P* prevents oil from finding its way from the bearing into the armature.

The bearing is of the self-oiling type, as shown. The end housing, securely bolted to the frame, carries the brush studs. The field coils are machine wound and thoroughly insulated, and are slipped over the poles before the latter are bolted in position.

The engine operates at 600 revolutions per minute, and at this speed the capacity of the generator is 5 kilowatts at 115 volts pressure. This particular set is now installed upon the steamer Aberdeen, a vessel recently built for the Pacific coast trade.

The set is more fully described in Bulletin No. 0734, issued by the manufacturers, the Bullock Electric Manufacturing Company, Cincinnati, Ohio.

A Modern Static Machine.

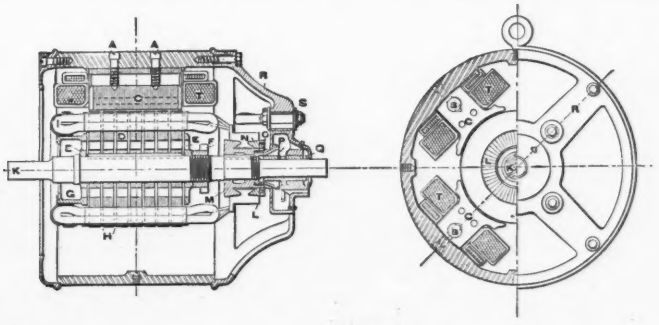


Fig. 2.—Sectional View of Generator of Marine Generating Set.

An Erie Telephone Dividend.

The directors of the Erie Telephone and Telegraph Company have declared a quarterly dividend of one and one-quarter per cent, payable November 13 to stock of record November 4. Books close November 4 and reopen November 13. This is an increase of one-quarter per cent in the quarterly rate, placing Erie telephone stock on a five per cent dividend basis.

A Modern Static Machine.

With the increasing demand by the medical profession for a reliable static machine for the treatment of nervous diseases, and also the demand for such a machine for use in X-ray work, numerous improvements have been made, until now many of these machines are practically perfect electrically and mechanically. Such a machine, manufactured by the McIntosh Battery and Optical Company, of Chicago, is shown in the accompanying illustration. It is of the Toepler–Holtz type, and is self-exciting and unaffected by the weather. The polarity remains unchanged during operation, and grounding one side is unnecessary. Especial attention has been paid to the ease of running, rigidity and freedom from vibration. By the use of ball-bearings friction has been diminished, and well braced supports prevent vibration, due to rapid running. With the plates running free, loss from the breakage of the glass is prevented. With the ordinary eight-plate machine, having four 28-inch stationary and four 25-inch revolving plates, a 10½-inch spark may be obtained. With double the number of plates little increase in electromotive force results, but as the sets of plates are in parallel the current is doubled. With an eight or sixteen-plate generator of this type the manufacturers state that an X-ray tube that can be handled by a coil can be worked with better results than those obtained through the use of the coil. No interrupter is used; consequently a steady glow in the tube is obtained. This is claimed to be an especial advantage in diagnostic work.

ADVANCE INFORMATION

New Telephone and Telegraph Companies.

PEEKSKILL, N. Y.—A new telephone line is being constructed from this place to Lake Mohegan. It is called a four-party system, the same as is used in Peekskill. A pay station will be located at Shrub Oak.

FORT SCOTT, KAN.—The Bell Telephone Company is putting up a line between this place and Kansas City.

SALINA, KAN.—The Salina Telephone Company has added Salemsburg and Falun to its toll-line, and every village in the county is now in connection with Salina by telephone. Bennington and Minneapolis will soon be added to the list of Salina connections.

CHICAGO, ILL. — The Swedish-American Telephone Company has been incorporated; capital stock, $5,000; incorporators, Foree Bain, Tiodolf Lidberg and M. F. Allen

DENVER, COLO.—The Denver Independent Electric-Telephone Company has been incorporated; capital, $500,000; incorporators, Z. T. Esmond, George B. Fisher, N. C. Hughes, E. C. Miles, W. J. Smith, Douglass Washburn, George W. Wright.

DECKERTOWN, N. J.—The Sussex Telephone Company has commenced the extension of its lines from Lafayette to Franklin, and thence to Deckertown *via* Hamburg.

TRENTON, N. J.—The Federal Telephone Company has been incorporated; the capital stock of the company is $10,000,000. The charter expressly states that the company can absorb other companies engaged in the operation of telephone lines.

WATERVILLE, MINN.—The Canon Valley Telephone Company has been incorporated; capital, $15,000.

SPRINGFIELD, ILL.—The Springfield Mutual Telephone and Telegraph Company has been incorporated; capital stock, $50,000; incorporators, Thomas W. Wilson, S. M. Rogers and J. M. Wilson.

LOUISVILLE, OHIO—There is considerable talk here of organizing a local telephone company, composed entirely of Stark County men.

RICHMOND, IND.—The new telephone company has completed its line to Connersville, and it is announced that the wires into Richmond, by way of Liberty, will be strung within the next week. The service will then be used in connection with the Home Telephone Company's system, which has outside connection with most of the towns in Wayne County.

BENZONIA, MICH.—A new independent telephone company has been organized here. The exchange will connect with Cadillac, Manistee, Traverse City, Benzonia, Frankfort, Honor, Thompsonville and other intermediate villages. The central exchange will be here. Sufficient shares have been taken to insure the success of the enterprise, and work will be begun immediately.

THOMASVILLE, PA.—The York Telephone Company is preparing to extend its lines from this place to La Botte and Abbottstown.

New Incorporations.

MILWAUKEE, WIS.—The American District Telegraph Company, of Wisconsin, has filed articles of association with the Secretary of State. Its purpose is to do a general telephone and telegraph, fire, burglar patrol and police telegraph business, etc., in the city of Madison and in any or all other cities and towns in Wisconsin. The capital stock is $25,000, and the general offices are to be in Milwaukee. The incorporators are Ben C. Wilkins, of Ashland; A. H. Allen, of Oshkosh, and W. R. Allen, of La Crosse. The officers are, president, H. D. Bennett; vice-president, I. McMichael; treasurer, J. Levin; secretary, G. R. Johnston. These, with W. J. Lloyd, constitute the board of directors.

CAMDEN, N. J.—The Loeber Incandescent Light and Heat Company, principal office, New Jersey Registration and Trust Company Building, has been incorporated; capital, $5,000,000; incorporators, Frank M. Wirgman, Frank R. Hansell, W. F. Eidell.

ARCHBALD, OHIO—The Independent Construction Company has been incorporated to construct and operate telephone exchanges; capital, $20,000; incorporators, A. J. Vernier, C. M. McLaughlin, G. H. Rorick, M. Rorick, J. B. Rorick.

NEW YORK, N. Y.—The Buffalo Battery Company has been incorporated; capital, $10,000; directors, William J. Knowles, Maria Knowles and John J. Gibson, of Buffalo.

NIAGARA FALLS, N. Y. — The Niagara Frontier Electrical and Machine Company has been incorporated; capital stock. $15,000; directors, Robert D. McIntyre and Edward E. Tuthill, Niagara Falls.

PHILADELPHIA, PA.—The Cutler Relay Company, composed of New York capitalists, has been incorporated to manufacture and sell electric telegraph relays and sounders.

PASSAIC, N. J.—The Paterson & Passaic Auxiliary Fire Alarm Company has been incorporated; principal office, No. 245 Main avenue; to install and lease auxiliary fire alarm systems; capital, $30,000; incorporators, James S. McKenzie, Carlton Hill, N. J.; Benjamin J. Ward, Ridgewood, N. J.; Charles R. Newman, Passaic, N. J.

TROY, N. Y.—The W. & L. E. Gurley Company has been incorporated to manufacture civil engineering, surveying, electrical, philosophical and mathematical instruments; capital stock, $200,000; the directors are William F. Gurley and A. Louise Gurley, of Troy; Paul Cook, of Lansingburg; Clara A. G. Williamson, of New Brunswick; W. J. and Mary M. G. Beveridge, of Indianapolis.

NEW YORK, N. Y.—The Weber Electrical Manufacturing Company has been incorporated to manufacture and deal in electrical appliances; capital stock, $1,000,000; incorporators, J. Pott, V. L Sawyer, J. Weber, E P. Schmidt; W. H. Klogh, all of New York city.

SYRACUSE, N. Y.—The Syracuse Automobile Company has been incorporated; capital, $10,000; directors, William D. Andrews, Henry T. Trebert and C. Arthur Benjamin, Syracuse.

New Electric Railways.

JEFFERSON CITY, MO.—The Secretary of State has chartered the St. Louis, Clayton & Western Railway Company, of St. Louis, with a capital stock of $2,000. The stockholders are L. G. McNair, F. R. Harris, L. W. Day, John G. McNair and T. J. Flanagan. The purpose of the company is to construct and operate a street railroad in St. Louis County, with its principal place of business in St. Louis city.

WILLIMANTIC, CT.—The Willimantic Street Railway Company has been organized with the following officers: President, J. M. Pettis, Boston; vice-president, George K. Nason, Willimantic; secretary, W. Ward Tuttle, Boston; treasurer, W. H. Abbott, Boston; directors, the above named and W. D. Grant and W. A. Arnold, of this city, and W. H. Clark, of Hartford.

CHARLESTON, W. VA.—The Kanawha Electric Company, composed of J. Q. Dickinson, president of the Kanawha Valley Bank, of this city, and Fayette County parties have been granted permission by the County Court to build an electric railway from Coalburg, in this county, to Mount Carbon, in Fayette County.

OMAHA, NEB —Articles of incorporation have been filed by the Omaha, Council Bluffs & Suburban Railway Company; W. S. Reed, A. Delong, Geo. Townsend and C. B. Hannan, incorporators; capital stock, $1,000,000. The company will operate street railways on the streets and avenues of Council Bluffs and Omaha, the suburban districts of East Omaha and between Council Bluffs and Lake Manawa.

GALENA, KAN.—The Fidelity Belt Railway Company has been incorporated; capital, $75,000. This line is to extend from Mineral, Cherokee County, to Pittsburgh and Galena. It will be an electric line.

COLUMBUS, OHIO—The Columbus, Buckeye Lake & Newark Traction Company has been incorporated; capital stock, $100,000.

DECATUR, ILL.—The Decatur Traction and Electric Company has been incorporated to operate railways by electric or other power; capital, $250,000; incorporators, D. S. Shellabarger, W. M. Shellabarger, L. C. Shellabarger.

LAFAYETTE, IND.—It is proposed to build an electric line from this place, *via* Shawnee Mound, to Covington, penetrating the coal-field at Newton.

Electric Light and Power.

PERKASIE, PA.—The Borough Council has awarded the contract for the erection and construction of the borough electric light plant to J. F. Buchanan & Company, of Philadelphia, for $11,500. Work to commence at once.

ROACHDALE, IND.—The Roachdale Electric Light and Telephone Company has been incorporated; capital stock, $5,000.

PARIS, ME —A movement has begun for lighting Bethel Village with electricity.

BOISE CITY, IOWA—The Gold Belt Power Company, Limited, to build and equip an electric plant; capital, $600,000; incorporators, W. H Watt, A. Smith, R. W. Berry, W. T. Riley, W. G. Page, all of Hailey; G. M. Parsons, of Boise City.

PENSACOLA, FLA.—The Consolidated Electric Light and Power Company has been incorporated with a capital of $20,000; the incorporators are T. E. Wells, William Hays and A. F. Warren.

AUSTIN, MINN.—At a special meeting of the City Council it was decided unanimously to build an electric light plant to be owned and operated by the city. The plant is to cost $20,000 and to be of the latest improved machinery and dynamos.

ALBANY, N. Y.—The Lake George Light, Heat and Power Company, of Warren County, to furnish electricity to Caldwell, Warrensburg and Bolton has been incorporated; capital, $50,000; directors, Royal C. Peabody, of New York city; Louis W. Emerson, of Warrensburg; Frank E Loughran and A. R. Noble, of Caldwell.

FAIRPORT, N. J.—An electric light plant is to be established here.

Increase of Capital.

COLUMBUS, OHIO—The Findlay Street Railway Company has increased its capital stock from $150,000 to $275,000.

SPRINGFIELD, ILL.—The Pana Modern Electric Light, Power and Street Railway Company has increased its capital from $50,000 to $100,000.

PITTSBURGH, PA.—At a meeting of the stockholders of the Suburban Rapid Transit Company it was decided to increase the capital stock of the company from $300,000 to $800,000.

YORK, PA.—The York Telephone Company increased its capital stock from $100,000 to $200,000.

Kindred.... ...Interests

The Fort Wayne Electric Works, Fort Wayne, Ind., has just issued a bulletin, No. 1,005, which handsomely illustrates and describes an interesting line of slow-speed, belt-driven, low-voltage generators.

The Sprague Electric Company, New York, has produced another handsome catalogue, Messrs. Bartlett & Company doing the artistic part, descriptive of Lundell generators for both the direct-connected and belted types. The catalogue is known as No. 64, and will be sent to any address upon application.

The India Rubber and Gutta Percha Insulating Company, Glenwood Works, Yonkers, N. Y., are sending to their many friends a handsome celluloid-topped blotter, advertising the well known Habirshaw wires and cables for all services; the cover also carries a series of valuable wire tables condensed for ready reference.

The telephone trade insist upon prompt shipments of material. While there is no shortage of catalogues in the hands of the trade, yet the Central Electric Company, Chicago, are issuing a small booklet on telephone construction and wiring material, and state that the staple goods shown therein can be quickly supplied from their Chicago stock.

The Connecticut Telephone and Electric Company, of Meriden, Ct., has just installed for the Paterson, Passaic & Suburban Telephone Company, of Paterson, N. J., an 1100-drop switchboard. This is the second board ordered by the same company from the Connecticut Telephone and Electric Company, the first board having a capacity of 500 drops.

The Telephone Manufacturing Company, of Sumter, S. C., of which Mr. F. C. Manning as vice-president is the active head, is enjoying an extremely heavy business, and it requires the attention and work of its entire force to meet the demand for apparatus. The company has recently closed contracts for several large switchboards and complete exchange outfits.

The Electric Appliance Company, Chicago, report enormously increased sales of Packard lamps. They attribute this to the fact that many users of incandescent lamps are beginning to learn by experience that it is economy to get the best lamp obtainable regardless of price. Their factory reports that they just closed a contract with an eastern rapid transit company for 70,000 lamps.

Street Railway Lamps of the "Sunbeam" type, made by the Western Electric Company, Chicago and New York, are well illustrated and described in Bulletin No. 14,001, just issued by that company. The lamps are made in efficiences of 3.1, 3.5 and 4 watts, and are of the anchored filament type; their candle-power is said to be accurately calibrated and maintained through an unusually long life.

The Siegrist Lubricator Company, St. Louis, Mo., has brought out in an illuminated royal purple cover, one of the handsomest catalogues that has been issued for a long time, to describe its automatic system of distributing and using lubricating oil. The large catalogue is elaborately illustrated with photographs showing the system in use in a variety of places, and contains also some letters from satisfied users of the system.

Cylinder and Valve Lubrication is the topic treated in a neat pamphlet just issued by the Joseph Dixon Crucible Company, of Jersey City, N. J. Careful experiments seem to fully demonstrate that a finely ground flake graphite furnishes a better body for mineral oils than any of the animal oils, and at the same time is not affected by any degree of heat, and moreover it fills up the microscopical inequalities of the bearing surface, making an ideally smooth surface. This attractive booklet is a well presented argument for the use of graphite lubricants.

The Manhattan Electrical Supply Company, 32 Cortlandt street, New York city, has issued Catalogue No. 11, of electric light, household, telephone and telegraph supplies. The catalogue is a handsomely illustrated volume of 352 pages, and the range of its contents is especially comprehensive. Everything electrical from "accumulators" to "zinc plates" is illustrated, concisely described and priced. The catalogue, which is of value to anyone in the least interested in electrical matters, may be had free for the asking.

The Michigan Electric Company, Detroit, has the contract for the new State Savings Bank Building now being erected in Detroit, according to plans by McKim, Mead & White, of New York. This will be one of the finest bank buildings in the country. The electrical contract comprises electric lighting, electric call system, interior telephone system, and probably their own electric plant with direct-connected dynamos driven by gas engines in conjunction with chloride storage batteries. This company has also just received an order for an elaborate sign for the "Wonderland" Museum Building in Detroit. It will take in the whole frontage, 175 feet long. It will include one row of colored lights along the cornice, one row following the lines of arches in front of the second floor, and the following signs: "Wonderland," in four-foot letters; "Continuous Vaudeville Theatre," in two-foot letters; "Entrance," in 18-inch letters. The signs are composed of raised Grecian letters mounted on a solid background. The face of the letters will be finished in white, the edges in red, the background in blue and borders in aluminum. The entire signs and decorative lighting mentioned will be fitted with about 1,000 incandescent lamps, arranged for control in division so that commutating effects may be produced. The Michigan Electric Company are conducting an interesting department for designing these electric signs, and one of their engineers devotes special attention to the work, producing most artistic and unique effects in lighting, colors and designs. The character of the work makes it difficult for houses not making a study of it. It produces the best effects on an economical basis.

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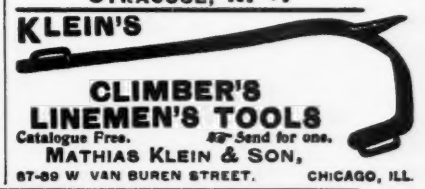
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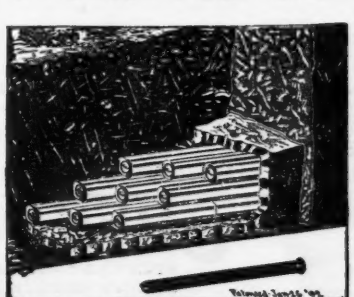
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Electrical.... Patents.

[Specially reported for this journal by E. S Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED OCTOBER 24, 1899.

635,287 Terminal for pole-pieces of accumulators; E. Andreas, Dresden, Germany.

635,319 Circuit-controlling device; J. Heinze, Jr., Revere, Mass.

635,373 Electric switch; L. W. Downes, Providence, R. I.

635,378 Coin-controlled call-recording device for telephone systems; J. B. Gill, San Francisco, Cal.—Includes a record card, a marking device, means projecting the marking device against the face of the card, means for moving the card to space the markings thereon, means for setting and locking the marking device for action, and coin-controlled means whereby the marking device is released by a current from the central station at will.

635,380 Electro-plating apparatus; R. E. Goodrich, New Britain, Ct.—Consists of a tank and anodes, a receptacle, means within the tank for supporting and revolving the receptacle, a cathode-conductor arranged in the receptacle, and means independent of the receptacle or its supports, for holding the cathode-conductor in operative relation to the receptacle.

635,395 Electric cut-out; J. Sachs, New York, N. Y.—Consists of a tubular case, having heads within the end portions, and a fusible strip of metallic terminals connected with the strip and passing across through the case and the end heads thereof, so as to hold the said heads within the tubular case.

635,396 Electric switch; J. Sachs, New York, N. Y.—Consists of the stationary clips forming the circuit-terminals, a safety cut-out having an enclosing case and projecting terminals adapted to pass into the stationary clips, and a switch-body and means for removably clamping the safety cut-out to the switch-body.

635,441 Resistance box; H. W. Leaonard, New York, N. Y.—Consists of a metal box, a resistance in the box, a finely divided mineral insulating filling material in said box, and a cover for said box having sealed joints.

635,446 Means for generating electricity from car-wheel axles; M. Moskowitz, Newark, N. J.

635,447 Electric incandescent lamp; W. J. Phelps, Elmwood, Ill.—A base for an incandescent lamp, having three or more terminals for the independent reception of current, one at least

635,485 Junction-box for electrical conductors; R. L. L. Hundhausen, Wilmersdorf, Germany—Consists of an apparatus with two compartments to which are led respectively the conductors of an electrical system of distribution of different polarity, a closure device normally maintaining the said compartments closed and means for securing its movement to permit of gaining access alternately to either of said compartments.

635,489 Dynamo-electric machine; N. J. Laschet, Darmstadt, Germany—Consists of rotatable and non-rotatable members thereof, an inclosure for the said members, and adjusting means movable substantially radially interposed between the said inclosure and the non-rotatable member, whereby the accurate adjustment of the air-gap between the said members may be readily effected.

635,493 System of calls and signals; R. J. Louis, Chicago, Ill.—Consists of a conduit, a missle adapted to pass through the said conduit, in connection with a signal displayed at a remote point, by a means set into operation by the said missle.

635,496 Reversing switch for electric motors; E. V. Matlack, St. Louis, Mo.

635,506 Electric igniter for gas engines; R. E. Olds, Lansing, Mich.

635,545 Electric arc lamp; D. Higham, Cambridge, Mass.

635,587 Flush switch; W. R. Pettis, New York, N. Y.

635,629 Electric arc lamp; F. S. Worsely, London, England.

635,637 Electrical warp stop-motion for looms; W. H. Baker, Central Falls, R. I.

635,681 Electrical machine; J. B. Hague, Horseheads, N. Y.—A machine for therapeutical purposes, consisting of a revoluble cylinder having its working surfaces formed by a hairy pelt adapted to frictionally brush against a person.

635,691 Electric switch; C. J. Klein, New York.

635,699 Arc-lamp hanger; G. E. McCormac, St. Joseph, Mo.

The Clonbrock Steam Boiler Company, of Brooklyn, N. Y., through General Manager Stephen V. Morrin, inform the ELECTRICAL REVIEW that the Climax boilers they had at the Trans-Mississippi and International Exposition, Omaha, Neb., 1898, and the Greater America Exposition, Omaha, Neb., 1899, have all been sold to the following parties: The Council Bluffs Street Railroad Company, Council Bluffs, Iowa, have purchased one 500-horse-power and one 250-horse-power boiler. The Madison Street Railroad and Electric Light Company, Madison, Iowa, have purchased one 250-horse-power boiler. The International Packing Company, of Omaha, have purchased for their new plant at Sioux City, three 500-horse-power and one 200-horse-power boiler.

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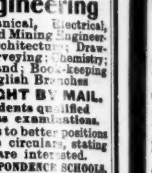

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